Designing Professional Spreadsheet Management Systems Using Microsoft Excel 2013 & 2016

A Simplified Guide To Learning MS Office Excel Data Analysis With Some Practical Examples And Exercises

Microsoft Office Tutorials Series

KELLY JOSEPH

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Designing Professional Spreadsheet Management Systems Using Microsoft Excel 2013 & 2016:

A Simplified Approach To Guide MS Office Excel Data Analysis With Some Practical Examples And Exercises

By Kelly Joseph

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DEDICATION

This book is dedicated to God for giving me the knowledge to write this book for those want to take a profession in Spreadsheet Management.

PREFACE

Microsoft Excel is one of the spreadsheet packages and also a very popular package because it has a very friendly user interface and above all, a very versatile application for calculation and data analysis. It is used most frequently by Bankers, Accountants, Office Managers, Co-operate planners, Administrators, Store Keepers and even students in the higher institutions studying courses like Computer Science, Information Management Technology, Financial Management Technology, etc. MS Excel has become so important in this century that without the knowledge of it, one cannot enjoy his or her job.

This book is professionally written for those who wish to standardize and develop their business organization and also have a deeper knowledge in spreadsheet management.

Kelly Joseph

HOW TO STUDY THE CHAPTERS OF THIS BOOK

It is assumed in this book that you don't have prior knowledge of any electronic spreadsheet package. It explains from the scratch, every bit of MS-Excel. So if you are a novice in spreadsheet management, you have found the right book. This book is prepared for you.

Each chapter of this tutorial contains the procedures to achieve some tasks, some practical examples and some practical exercise for you in order to help you comprehend its content.

The first chapter contains the introduction to MS-Excel and its history. It also familiarizes you with some of its features.

It is recommended in this book that you have a PC or an access to a computer system, so as to enable you practicalize the procedures and exercises. Also try as much as possible to practice the exercises in this book for a deeper comprehension of the contents of this book.

CHAPTER 1: INTRODUCTION TO MS-EXCEL 2013 AND 2016

INTRODUCTION

This book gives you a grounded knowledge on spreadsheet management using Microsoft Excel. We assume that you don't have any previous knowledge of spreadsheet management. This will enable us take it bit by bit to make sure you understood every aspect of spreadsheet management. So don't be discouraged if this is your first time of hearing about Microsoft Excel or have never used it before.

Almost all career fields keep record of their business organizations and also directly or indirectly perform calculations and data analysis. Most of these fields have expanded and developed to an extent that they need a computerized system to help them perform some difficult tasks or calculation s efficiently and accurately. Some of these tasks include staff payroll system, forecasting and sales trend, students' grade list, loan amortization, sales report, etc. With an electronic spreadsheet package like Microsoft Excel, all these tasks can be simplified and managed.

ELECTRONIC SPREADSHEET

This is a computer program that enables one to carry out calculations on several rows and columns of numbers. MS-Excel is a typical example of an electronic spreadsheet.

A spreadsheet can be used to perform mathematical and financial projects, budget, cash flow projections, stock price tracking, balance sheet, etc. in other words, spreadsheet is a programmed table of information much like an accountants ledger book designed with multiple rows and columns where numerical data could be entered and manipulated for easy financial interpretation and analysis.

SPREADSHEET PROGRAMS

These are programs or application systems used for spreadsheet management. There are many of them. Some of them include.

1. Microsoft Excel
2. Lotus 123
3. Lotus Smart Suite
4. Multi-plan
5. Quattro pro
6. Super cals
7. AmiPro
8. Symphony, etc.

WHAT IS MICROSOFT EXCEL?

It is an integrated electronic spreadsheet and graphics software package designed to perform mathematical calculations on rows and columns and produces result which can be either qualitative or quantitative. It has some powerful tools that allow you perform variety of tasks for business, science and engineering. It can also be used in database management.

USES OF MS-EXCEL

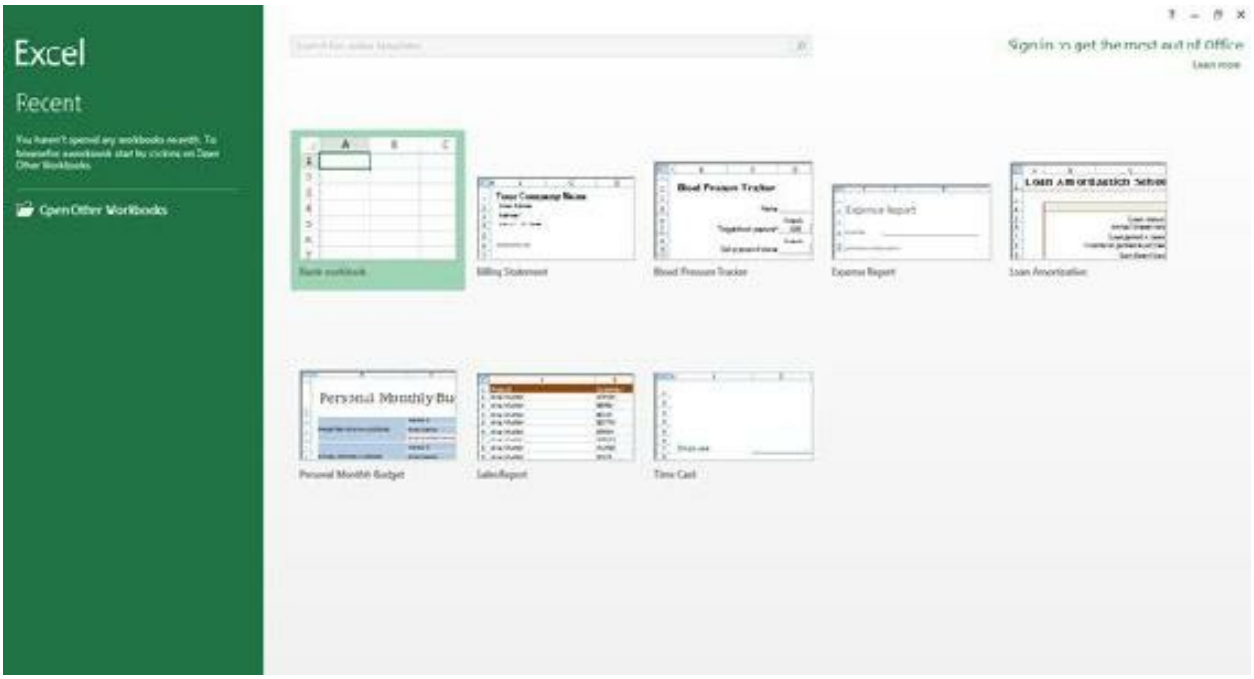
1. It is used in preparing financial reports.
2. It is also used in preparing financial budget.
3. It is used to prepare students' grade list.
4. It can be used to prepare reports (both sales and expense).
5. It is used in sales forecasting and trend.
6. It is also used to prepare inventory management.
7. It can be used to prepare Billing Statement
8. It can be used to design Blood pressure Tracker
9. It can be used to prepare Loan Amortization
10. It can be used to design Time Card

GETTING STARTED WITH MICROSOFT EXCEL AND THE HISTORY OF MS-EXCEL

HISTORY OF MS-EXCEL

MS-Excel is a very popular spreadsheet program designed mainly for Windows Operating System (OS), which is a very user friendly OS. As at 2016, there are about nine versions so far namely; Excel 2.0, Excel 97, Excel 2000, Excel XP, Excel 2003, Excel 2007, Excel 2010, Excel 2013 and Excel 2016.

The first three are so obsolete that they are no more mentioned and were designed for older versions of Windows Operating Systems such as Windows 3.1, Windows 95 and 98.



Also, Excel XP and 2003 have most features alike, such that the knowledge of them permits one to work with other versions easily, both older and newer versions. Excel 2007, 2010 and 2013 also have most features alike especially 2010 and 2013.

However, Excel 2007, 2010 and 2013 are quite different from the previous versions because the introduction of tab groups in place of the drop down menu system. The first visible difference between MS-Excel 2010 and 2013 is

that Excel 2013 has some new already made templates available. Some of these new already made templates include:

- Billing Statement
- Blood pressure Tracker
- Expense Report
- Loan Amortization
- Personal Monthly Budget
- Sales Report
- Time Card

These templates can save you a lot of time and helps to standardize your projects.

THE NEW FEATURES IN EXCEL 2016

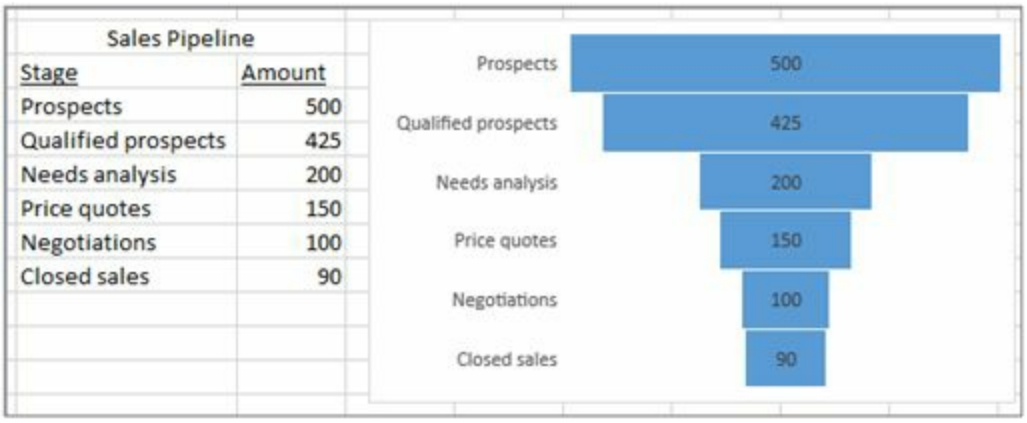
Excel 2016 for Windows has all the functionality and features you're used to, with some added features and enhancements. Here are some of the top new and improved features for Excel 2016.

January 2016 Updates

The following features are only available to Office 365 subscribers. They will first roll out to Office Insider participants, and later to consumer and commercial Office 365 subscribers. If you have an Office 365 subscription, make sure you have the latest version of Office.

Funnel charts

Funnel charts show values across multiple stages in a process. Typically, the values decrease gradually, allowing the bars to resemble a funnel. Read more about funnel charts here.



Improved Autocomplete

Excel autocomplete isn't as picky as it was before. For example, let's say you want to use the NETWORKDAYS function, but you can't remember how it is spelled. If you just type **=DAYS**, the autocomplete menu will bring back all of the functions that contain "DAYS," including, **NETWORKDAYS**. (Before, you had to spell the function name exactly.)

TEXTJOIN

This function combines text from multiple ranges, and each item is separated by a delimiter that you specify. Learn more about TEXTJOIN here.

CONCAT

This new function is like CONCATENATE, but better. First of all: it's shorter and easier to type. But it also supports range references in addition to cell references. Learn more here.

IFS

Are you tired of typing complicated, nested IF functions? The IFS function is the solution. With this function, conditions are tested in the order that you specify. If passed, the result is returned. You can also specify an else "catch all" if none of the conditions are met. Learn about IFS here.

SWITCH

This function evaluates an expression against a list of values in order, and returns the first matching result. If no results match, the "else" is returned. Details and examples are spelled out here.

MAXIFS

This function returns the largest number in a range that meets a single or multiple criteria. More information available here.

MINIFS

This function is similar to MAXIFS, but it returns the smallest number in a range, that meets a single or multiple criteria. Read more about the MINIFS function.

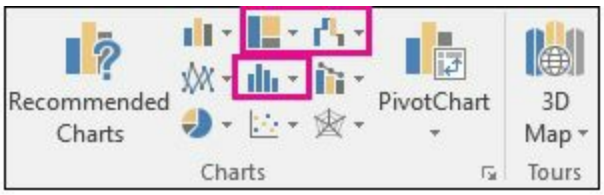
SEPTEMBER 2015 UPDATES

Unless otherwise specified, both Office 365 subscribers and Office 2016 one-time purchasers get the following new features.

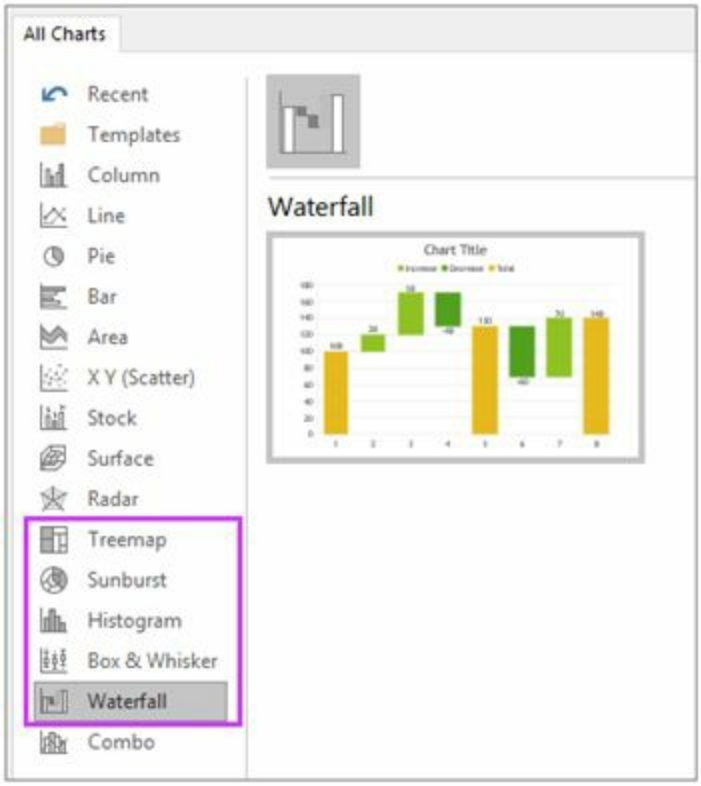
Six New Chart Types

Visualizations are critical to effective data analysis as well as compelling storytelling. In Excel 2016, we've added six new charts—with the same rich formatting options that you are familiar with—to help you create some of the most commonly used data visualizations of financial or hierarchal information or for revealing statistical properties in your data.

Click **Insert Hierarchy Chart** on the **Insert** tab to use the **Tree map** or **Sunburst** chart, click **Insert Waterfall or Stock Chart** for **Waterfall**, or click **Insert Statistical Chart** for **Histogram**, **Pareto**, or **Box and Whisker**.

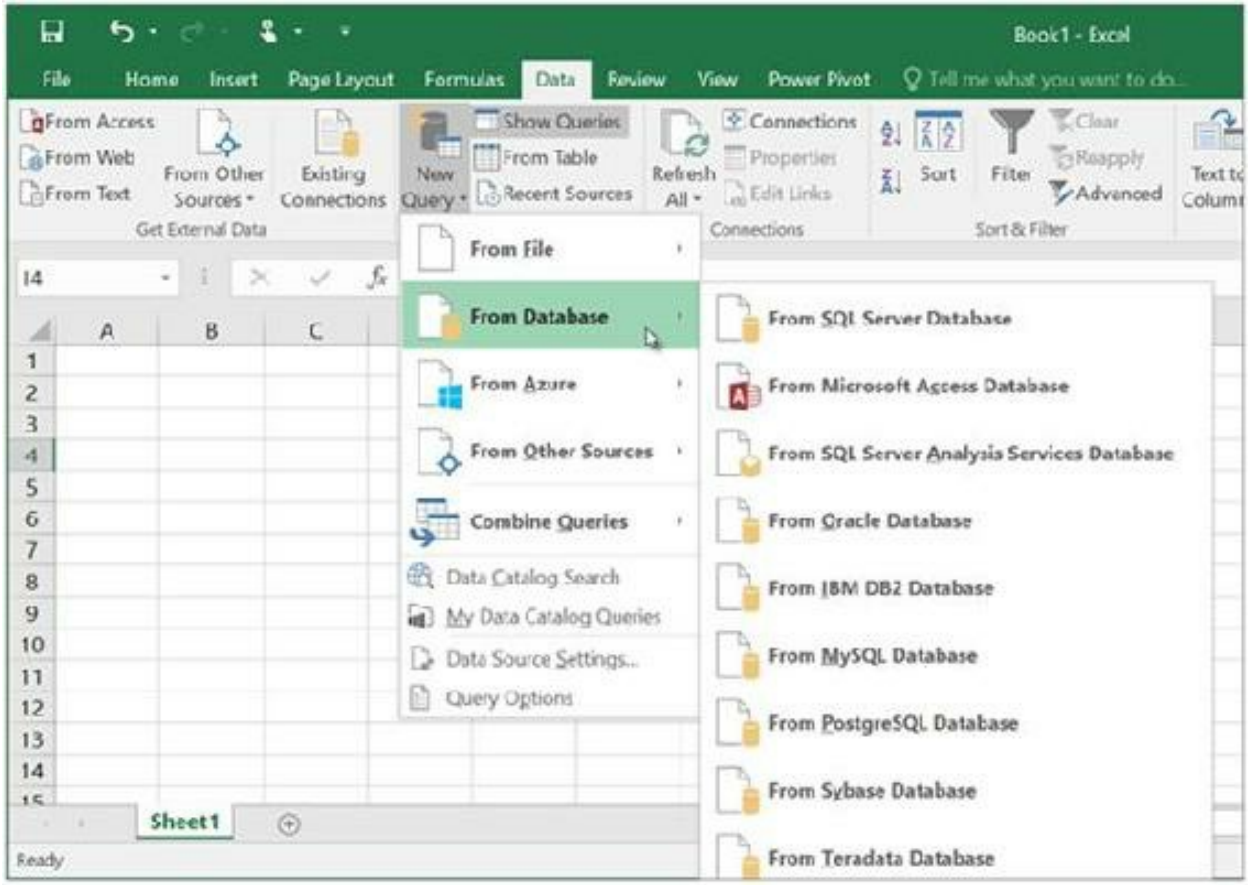


Or click **Recommended Charts** > **All Charts** to see all the new charts.



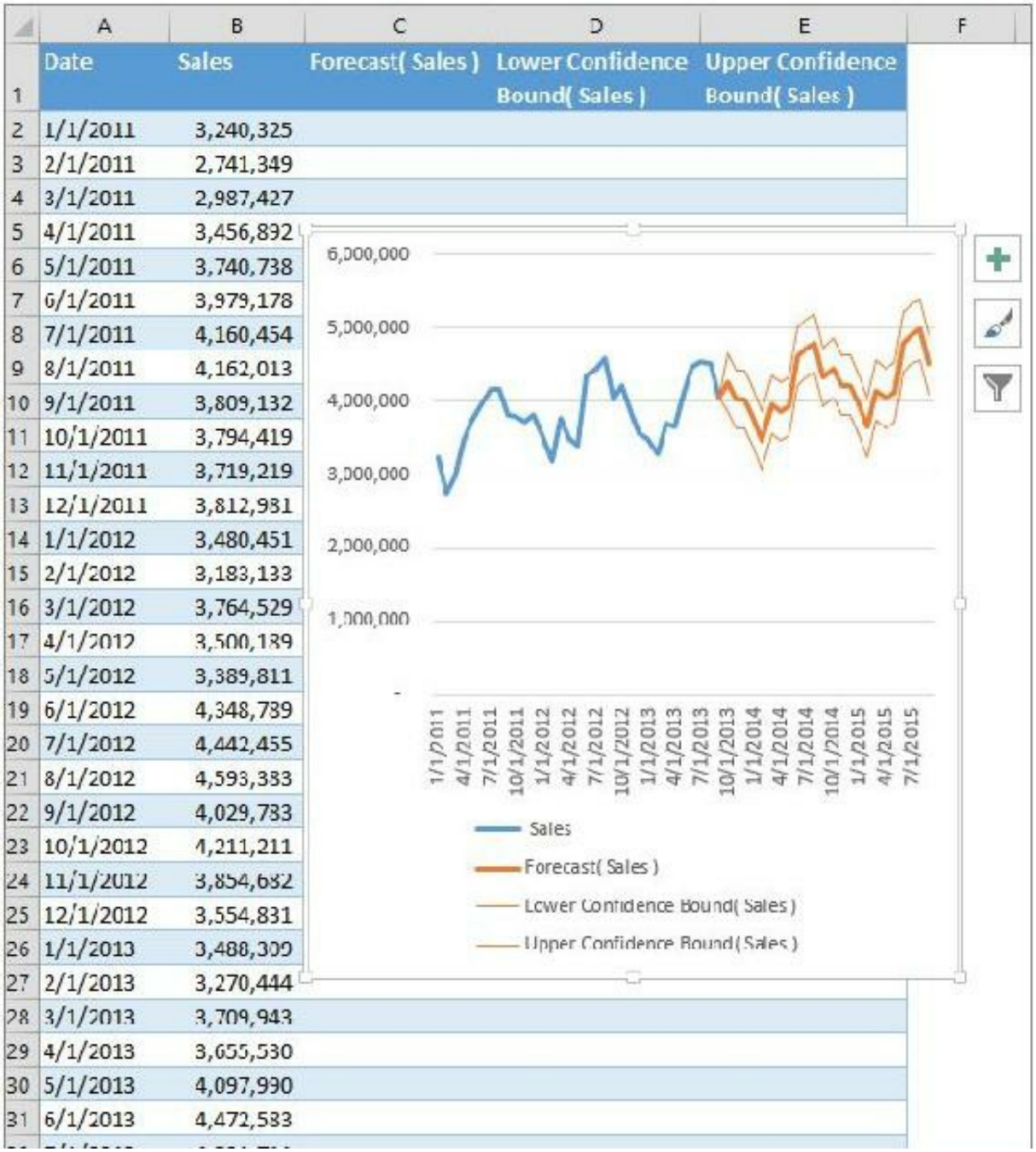
Get and Transform (Query)

Before analysis can begin, you must be able to bring in the data relevant to the business question you are trying to answer. Excel 2016 now comes with built-in functionality that brings ease and speed to getting and transforming your data—allowing you to find and bring all the data you need into one place. These new capabilities, previously only available as a separate add-in called Power Query, can be found natively within Excel. Access them from the **Get & Transform** group on the **Data** tab.



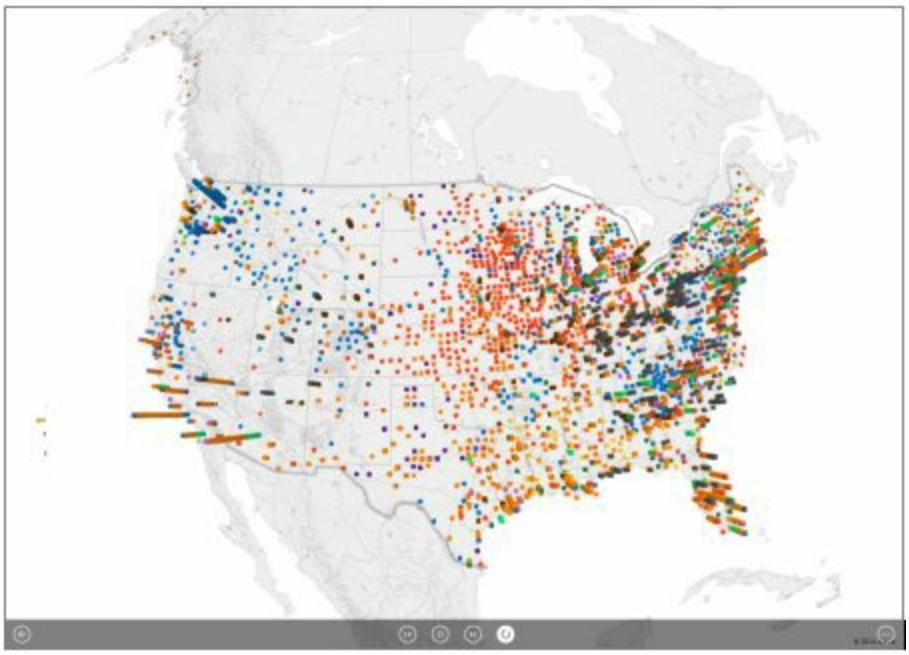
One Click Forecasting

In previous versions of Excel, only linear forecasting had been available. In Excel 2016, the FORECAST function has been extended to allow forecasting based on Exponential Smoothing (such as, FORECAST.ETS () …). This functionality is also available as a new one-click forecasting button. On the **Data** tab, click the **Forecast Sheet** button to quickly create a forecast visualization of your data series. From the wizard, you can also find options to adjust common forecast parameters, like seasonality, which is automatically detected by default and confidence intervals.



3D Maps

Our popular 3D geospatial visualization tool, Power Map, has been renamed and is now available to all Excel 2016 customers and is built into Excel. This innovative set of storytelling capabilities has been renamed 3D Maps and can be found along with other visualization tools by clicking **3D Map** on the **Insert** tab.



Financial templates

Take advantage of the new My Cash flow template, and the Stock Analysis template. These templates track what you earn, how much you spend, and where your spending occurs. Plus, quickly analyze and compare the performance of selected stocks over time.

Calendar Insights Template

View your calendar as a dashboard and drill into the data. You'll get a better handle on how you spend your time, and identify ways to get more out of your days.

PivotTable enhancements

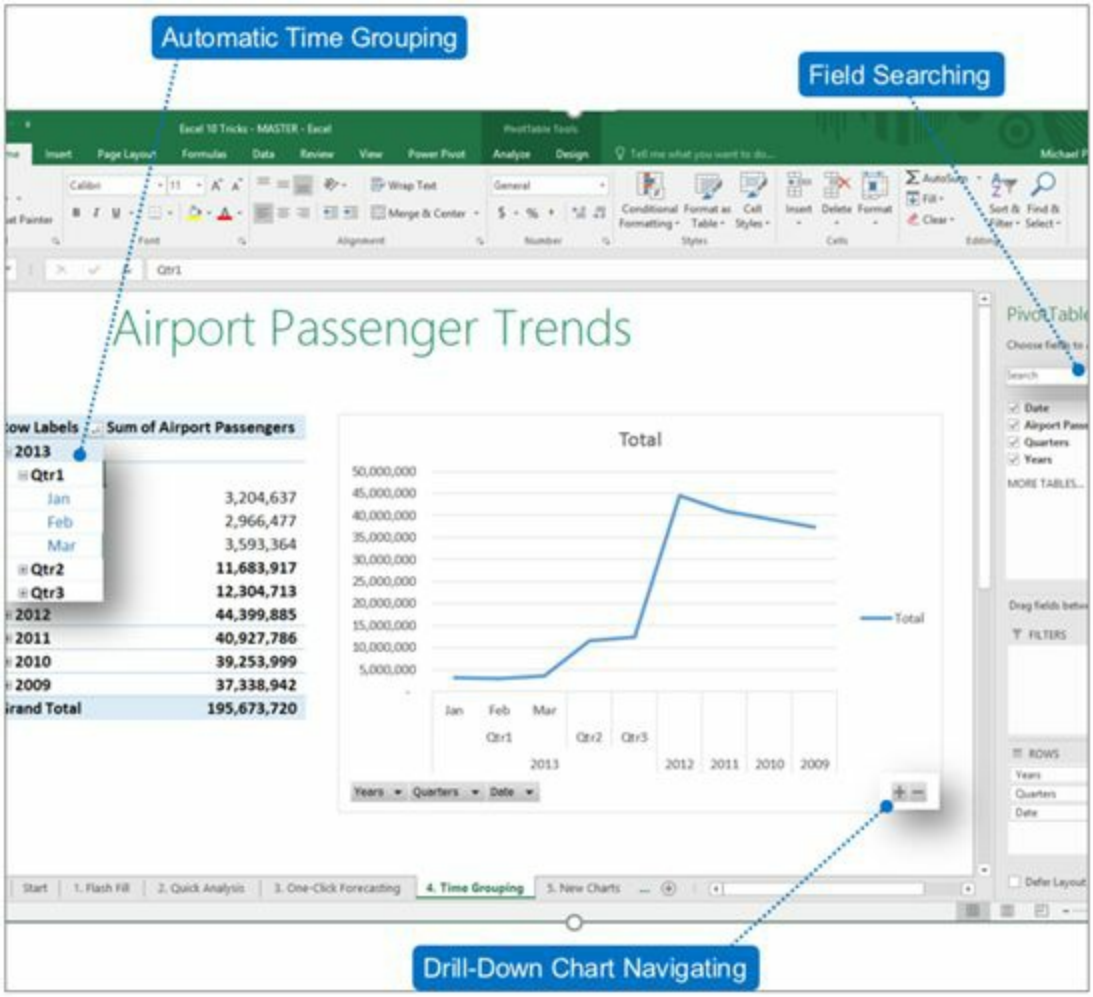
Excel is known for its flexible and powerful analysis experiences, through the familiar PivotTable authoring environment. With Excel 2010 and Excel 2013, these experiences was significantly enhanced with the introduction of Power Pivot and the Data Model, bringing the ability to easily build sophisticated models across your data, augment them with measures and KPIs, and then calculate over millions of rows with high speed. Here are some of the enhancements we made in Excel 2016, so that you can focus less on managing your data and more on uncovering the insights that matter.

- **Automatic relationship detection:**
  Discovers and creates relationships among the tables used for your workbook's data model, so you don't have to. Excel 2016 knows when your analysis requires two or more tables to be linked together and notifies you. With one click, it does the work to build the relationships, so you can take advantage of them immediately.
- **Creating, Editing and Deleting Custom Measures:**
  Can now be done directly from the PivotTable fields list, saving you a lot of time when you need to add additional calculations for your analysis.
- **Automatic time grouping:**
  Helps you to use your time-related fields (year, quarter, month) in your Pivot Table more powerfully, by auto-detecting and grouping them on your behalf. Once grouped together, simply drag the group to your PivotTable in one action and immediately begin your analysis across the different levels of time with drill-down capabilities.

PivotChart Drill-down Buttons

These buttons allow you to zoom in and out across groupings of time and other hierarchical structures within your data.

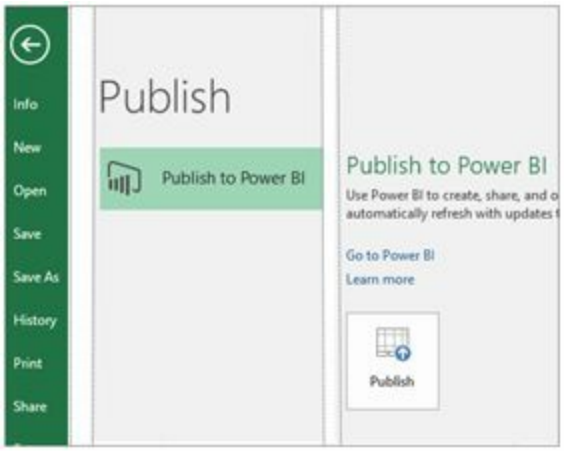
- **Search in the PivotTable:**
  Field list helps you get to the fields that are important to you across your entire data set.
- **Smart rename:**
  Gives you the ability to rename tables and columns in your workbook's data model. With each change, Excel 2016 automatically updates any related tables and calculations across your workbook, including all worksheets and DAX formulas.
- **Multiple usability improvements:**
  Have also been made. For example, delayed updating allows you to perform multiple changes in Power Pivot without the need to wait until each is propagated across the workbook. The changes will be propagated at one time, once the Power Pivot window is closed.



Multi-select Slicer

Now you can select multiple items in an Excel slicer on a touch device. This is a change from prior versions of Excel where only one item in a slicer could be selected at a time using touch input. You can enter Slicer multi-select mode by using the new button located in the Slicer's label.

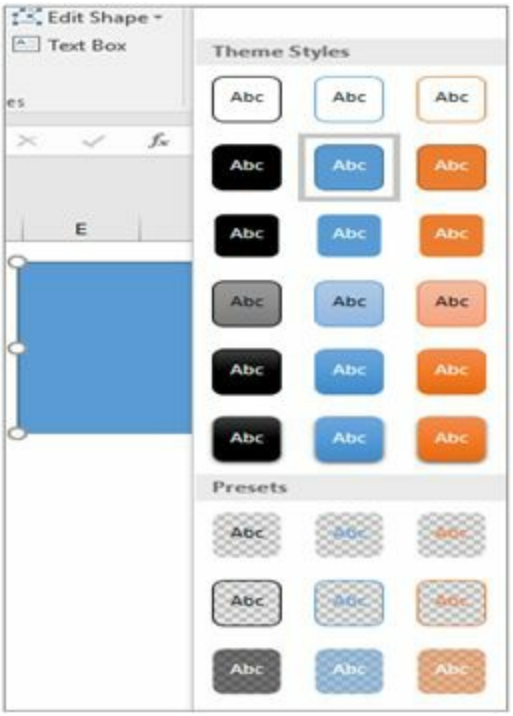
Publish and Share your Analysis with Power BI



A report is not complete without being able to share it with the right people. Once you're finished preparing your data analysis, you can share it with your workgroup or clients through Power BI with just one button. Once published to Power BI, use your data models to quickly construct interactive reports and dashboards. With Excel Online support built into Power BI service, you can also display your fully formatted Excel worksheets as well.

Quick Shape Formatting

This feature increases the number of default shape styles by introducing new "preset" styles in Excel.

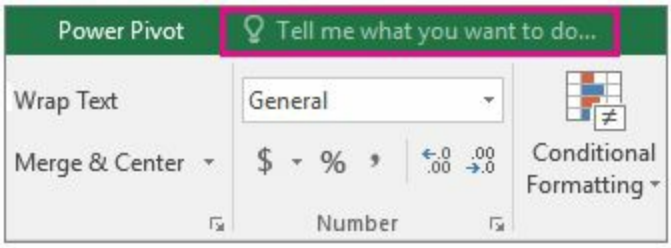


Insert Pictures with the Correct Orientation

With automatic image rotation, once you insert an image into Excel, it automatically rotates the picture to match the camera's orientation. You can manually rotate the image to any position after insertion. Note that this only affects newly inserted images and does not apply to pictures in existing documents.

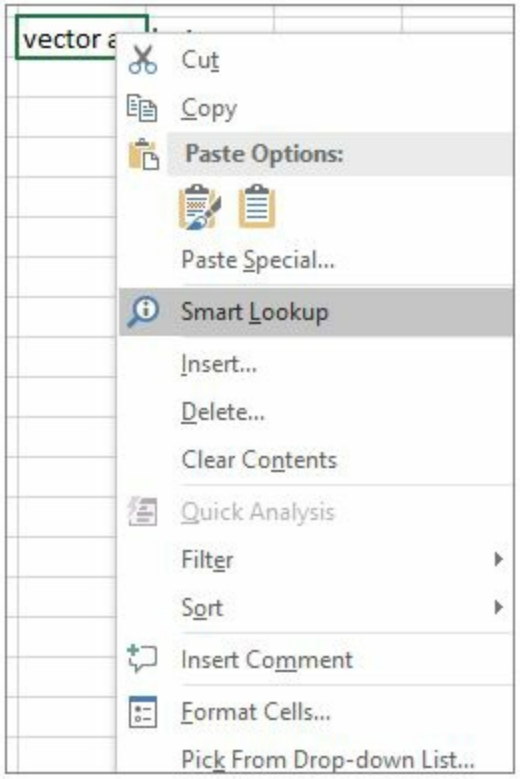
Do Things Quickly with "Tell me what you want to do" Text Box

Excel 2016 has a text box on the ribbon that says **Tell me what you want to do**. This text box or text field allows you to enter words and phrases related to what you want to do next and quickly get to features you want to use or actions you want to perform. You can also choose to get help related to what you're looking for, or perform a Smart Lookup on the term you entered.



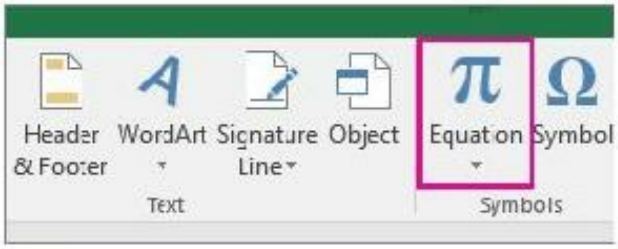
The Insight Pane: Insights into what you're working on

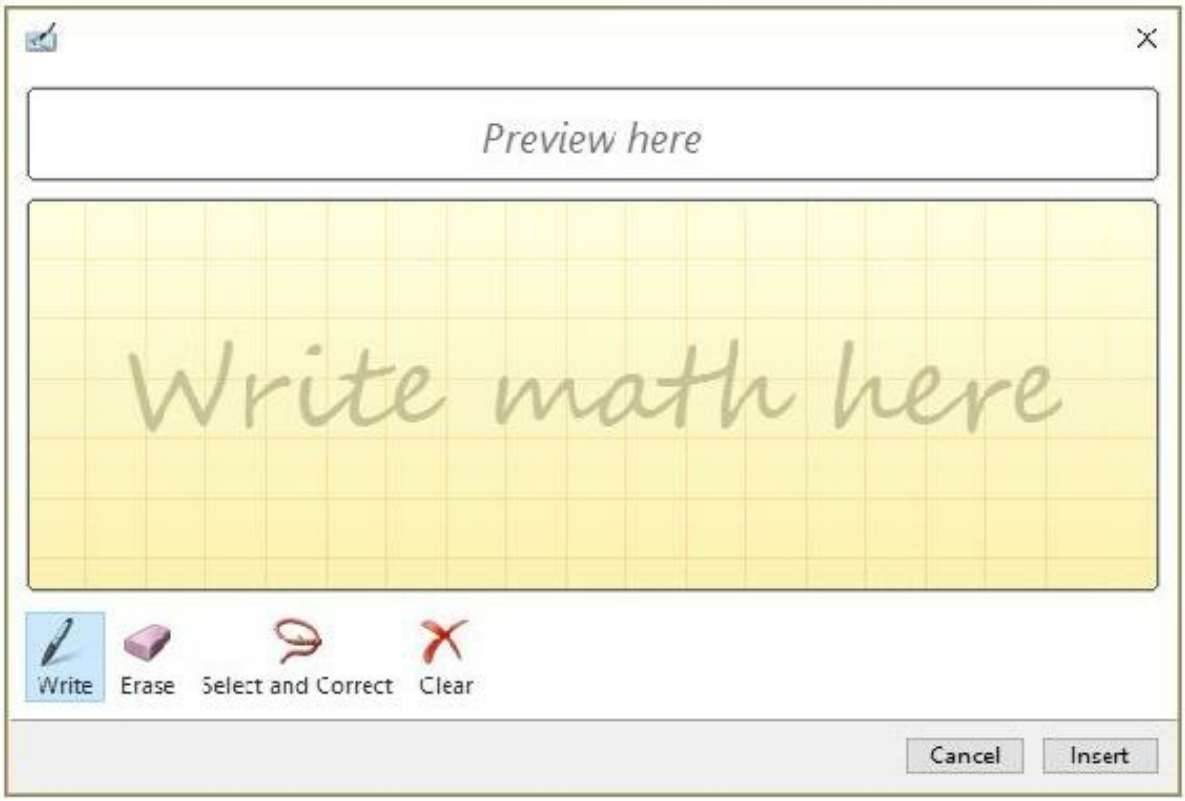
The Insights pane in MS-Excel 2016 is powered by Bing, offers more than just definitions. When you select a word or phrase, right-click it, and choose **Smart Lookup**, the insights pane will open with definitions, Wiki articles, and top related searches from the web. You can also get to Smart Lookup any time by going to **Review** > **Smart Lookup** and entering a query there.



Ink Equations

Including math equations has gotten much easier. Now, you can go to **Insert** > **Equation** > **Ink Equation**, any time you want to include a complex math equation in your workbook. If you have a touch device, you can use your finger or a touch stylus to write math equations by hand, and Excel will convert it to text. (If you don't have a touch device, you can use a mouse to write, too). You can also erase and select and correct what you've written as you go.

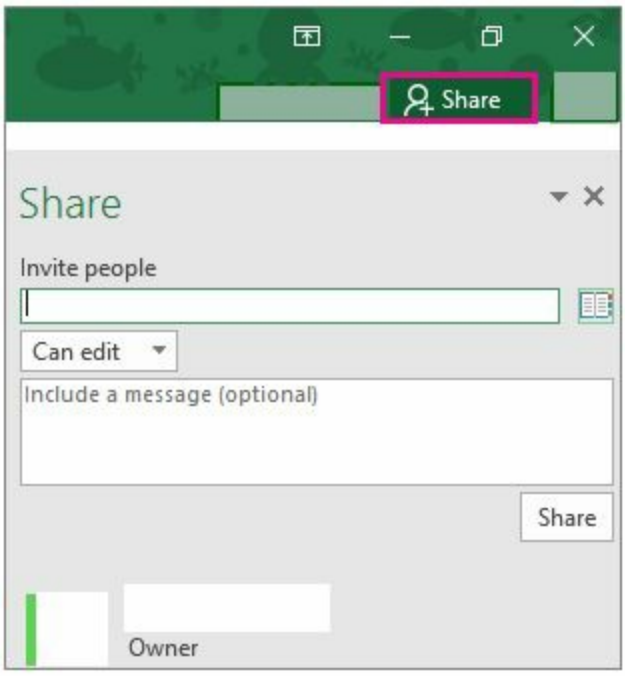




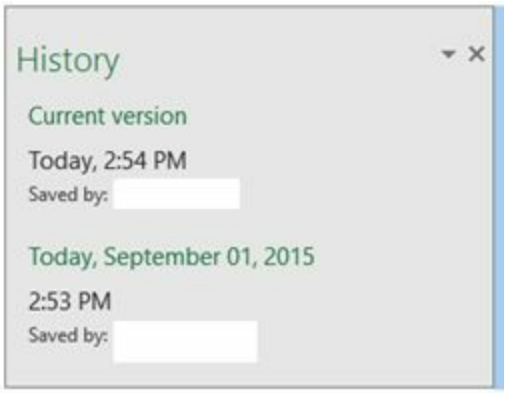
Sharing Simplified

To share your spreadsheet with friends on SharePoint, One Drive, or One Drive for Business, choose **Share** on the ribbon. Sharing has been simplified in MS-Excel 2016.

These changes bring together two key aspects of collaboration: who has access to a given document and who is currently working with you on the document. Now you can view both pieces of information in one place from the Share dialog box.



Improved version history

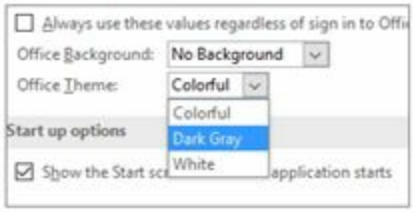


To see a complete list of changes that have been made to your workbook and access earlier versions, go to **File** > **History**.

Please note that this feature is only supported for files stored on One Drive for Business or SharePoint.

New Themes

There are now three Office themes that you can apply: Colorful, Dark Gray, and White. To access these themes, go to **File** > **Options** > **General**, and then click the drop down menu next to **Office Theme**.



Data Loss Protection (DLP) in Excel

Data Loss Protection (DLP) is a high-value enterprise feature that is well loved in Outlook. We are introducing DLP in Excel to enable real time scan of content based on a set of predefined policies for the most common sensitive data types (e.g., credit card number, social security number, and US bank account number). This capability will also enable the synchronization of DLP policies from Office 365 in Excel, Word, and PowerPoint, and provide organizations with unified policies across content stored in Exchange, SharePoint and One Drive for Business.

Throughout this tutorial, I shall be using MS-Excel 2013 for illustration. I will also be showing you the new ways of achieving the same step using MS-Excel 2016 when the need arises. My reason for choosing MS-Excel 2013 for illustration is because it is the most popular version of Excel as at when this tutorial was prepared and most people find it difficult to adapt to the new operating environment. The database tabs in MS-Excel 2013 contain panes which accommodates all the tools needed for database manipulation.

HOW TO GET MS-ACCESS 2016 OR 2013 ON YOUR WINDOWS PC

MS-Excel is one of the programs of the multi-software package Microsoft Office. Microsoft Office package has five main Office programs namely:

- MS-Access (for database management)
- MS-Excel (for spreadsheet Management)
- MS-Word (for document editing and formatting)
- MS-PowerPoint (for presentation in slides)
- MS-Publisher (for book publishing and editing)

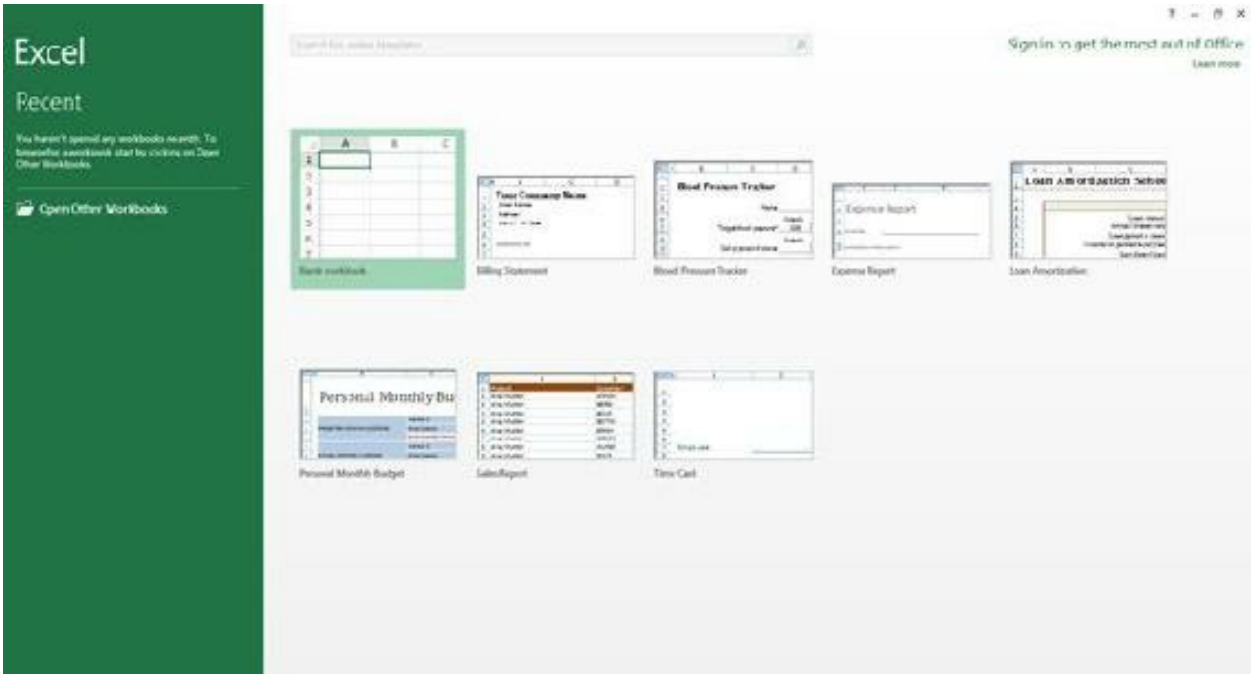
Some PC models like HP Windows 8 PC come with a pre-installed MS Office 2013 package. Search your PC to see if it came with a preinstalled MS-Office Package. If you need MS-Office 2016, visit Microsoft store. There are some sites that allow you download a Copy of MS Office for free. Feel free to search the web. You can also get only MS-Access if you wish. MS-Office software is popular; so many software vendors will have it. Just check around few stores in your locality.

HOW TO LOAD MS-EXCEL INTO MEMORY

To load MS-Excel into your PC memory:

1. Click the **Start** button located extreme left of the taskbar.
2. Type the word **excel** to call up the search charm.
3. From your search result, click on **MS-Excel 2010** or **MS-Excel 2013** or **MS-Excel 2016** depending on the version installed on your PC .

4. Then windows loads the program into memory and MS-Access welcome window will display as shown below depending on the version installed on your PC.



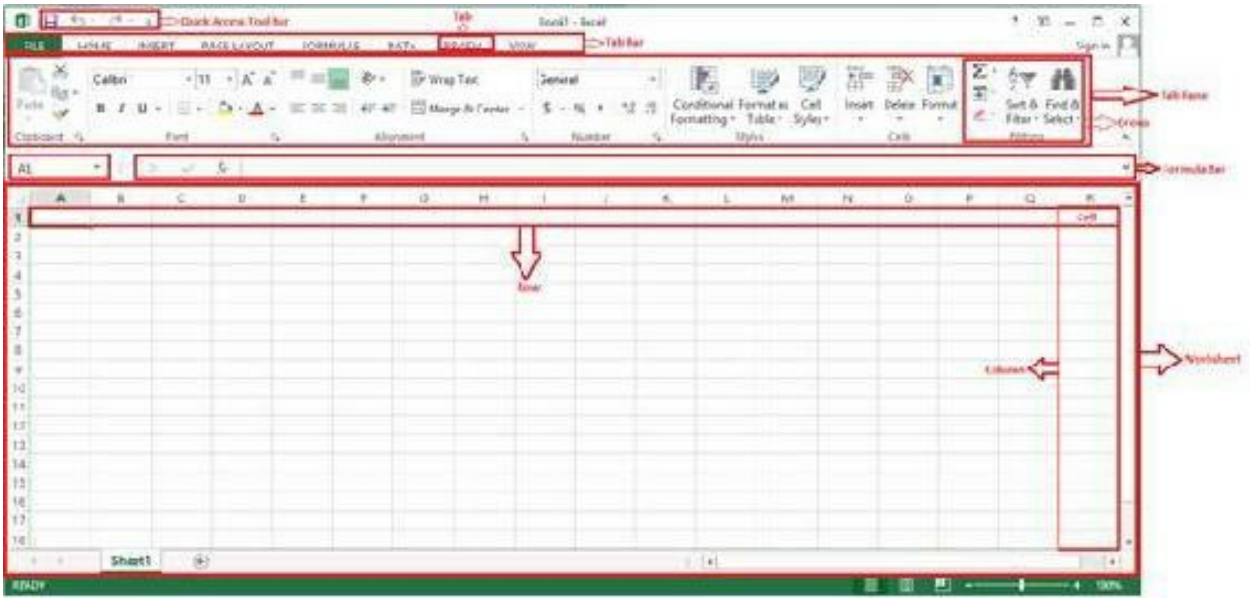
NOTE:

To create a blank workbook in Excel 2013 and 2016, Click **Blank workbook from the welcome window.** But in Excel 2010, a blank workbook is created

by default when you launch the program.

THE MS-EXCEL USER INTERFACE

The MS-Excel user interface is made up of many components as shown below. Study the diagram and its labels



APPLICATION AREAS OF MS-EXCEL

MS-Excel has numerous application areas, but there are three basic application areas of MS-Excel. They include:

- Calculations
- Graphics Management
- Database Management

BASIC TOOL OF MS-EXCEL

The basic tool of MS-Excel is the **WORKSHEET.** This is because all the MS-Excel works and processes involve a worksheet.

THE DIFFERENCE BETWEEN A SPREADSHEET WORKBOOK AND A WORKSHEET

Most Spreadsheet Mangers and users find it very difficult to differentiate between a workbook and a worksheet. As a result, they use it interchangeably.

Spreadsheet Worksheet

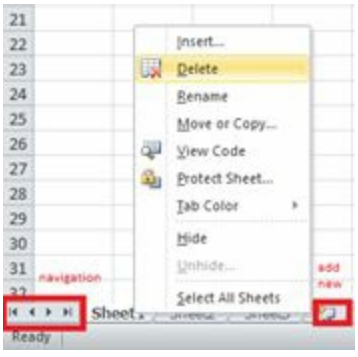
This is where you type, calculate and store data in MS-Excel. It comprises of gridlines of columns and rows. A worksheet contains 256 columns, labeled from A – Z, AA – ZZ, BA – BZ, etc. and 65536 rows labeled from 1 – 65536.

Spreadsheet Workbook

This is an MS-Excel file where you work and store your data. Each workbook can contain many worksheets. It can have different types of worksheet i.e. can have a sales data worksheet and also have a chart workbook.

NOTES:

By default, a workbook in MS-Excel version 2010 and below has three worksheets. These sheets are named **sheet 1**, **sheet 2** and **sheet 3** by default. Each of these sheets has a tab located at the bottom left of the workbook window. You can add another sheet by clicking on the **new sheet** tab next to the last sheet. You can also delete and insert a worksheet in between existing worksheets. To achieve any of them, right-click on the worksheet left to where you wish to insert the new sheet and click **insert** > **worksheet** or **delete** as the case may be**.**



In MS-Excel 2013 and 2016, a workbook has only one worksheet named sheet one by default. This sheet has a tab located at the bottom left of the workbook window. To add a new worksheet, click one **new sheet** as shown below. You

can also insert in between worksheets following the procedure listed in the last paragraph.

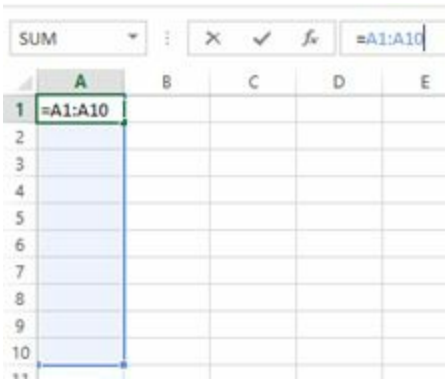
WORKSHEET TERMINOLOGIES

1. **CELL:**
   This is an intersection of rows and columns where data is stored.
2. **CELL ADDRESS:**
   This is a descriptive name given to a cell for reference purpose. For example, the first cell in a workbook (i.e. the intersection of column 1 and row 1) is given a cell address of **A1**.
3. **CELL ENTRIES:**
   These are data in form of values and labels stored within a cell.
4. **CURRENT OR ACTIVE CELL:**
   This is the particular cell you are working on, which is always highlighted by a cell pointer.
5. **CELL POINTER:**
   This is a rectangular bar that always highlights or selects the active cell.
6. **CELL RANGE:**
   This refers to two or more selected cells which can be formatted, edited, printed or deleted.

TYPES OF CELL RANGE

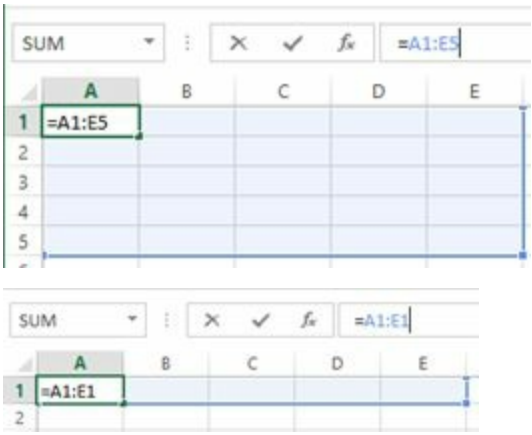
There are three types of cell range. They include:

- **Vertical or columnar cell range:**
  This refers to selection within a column. For example, to highlight cells A1 to A10, type =**A1:A10** in the formula bar or simply click on the first cell and drag all over to the last cell as shown below.



- **Horizontal or row cell range:**
  This refers to selection within a row. For example, to highlight cells A1

to E5, , type **=A1:E1** in the formula bar or simply click on the first cell and drag all over to the last cell as shown below.



- **Rectangular cell range:**
  This refers to selection between rows and columns. For example, to highlight all the cells between cells A1 to E5, type **=A1:E5** in the formula bar or simply click on the first cell and drag all over to the last cell as shown below.

7. **DEPENDENT CELL**

This is the cell that contains the formula that refers to other cells. For example, if B2 contains the formula **=D5**, cell B2 is a dependent cell of cell D5.

8. **PRECEDENT CELL**

This is a cell that is being referred to by a formula in another cell. For example, if cell B2 contains the formula **=D5**, cell D5 is a precedent cell of cell B2.

WORKSHEET OPERATIONS

These are the touches or manipulations made on a worksheet in order to make it attractive, presentable, unique and dynamic.

INSERTING A CELL

There may be need to add a new cell between two existing cells in a worksheet.

To Insert a Cell:

1. Position the cursor on the cell whose immediate left side you desire to add the new column.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Insert** menu in the **Cells** group.
4. Click **insert cells** and select **Shift cells right**.

5. Click **OK**.

INSERTING A COLUMN

There may be need to add a new column between two existing columns in a worksheet.

To Insert a Column:

1. Position the cursor on the column whose immediate left side you desire to add the new column.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Insert** command in the **Cells** group.
4. Click **Insert sheet columns**. Excel inserts the column.
5. Click **OK**.

INSERTING A ROW

To Insert a Row Between Two Existing Rows in a Worksheet:

1. Position the cursor on the column whose immediate top you desire to add the new row.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Insert** menu in the **Cells** group.
4. Click **Insert sheet rows**. Excel inserts the row.

DELETING A ROW OR A COLUMN

To Delete a Row or a Column from a Worksheet:

1. Position the cursor on the row or column you wish to delete.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Delete** menu in the **Cells** group.
4. Click **Delete sheet rows** or **Delete sheet columns** as the case may be. Excel deletes the row or column.

INSERTING A WORKSHEET

To Insert a Worksheet in Between Existing Worksheets:

1. Activate the worksheet whose immediate left you wish to insert the new worksheet.
2. Click the **home** tab.
3. Click the dropdown arrow under the **Insert** menu in the **Cells** group.
4. Click **Insert sheet**.

DELETING A WORKSHEET

To Delete a Worksheet:

1. Activate the worksheet you wish to delete.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Delete** menu in the **Cells** group.
4. Click **Delete sheet**.

RENAMING A WORKSHEET

To Rename a Worksheet:

1. Activate the worksheet you wish to rename.
2. Click the **Home** tab.

3. Click the dropdown arrow under the **Format** menu in the **Cells** group.
4. Click **Rename sheet**, a sub-option under the **Organize Sheet** option. The default sheet name located at the bottom left is highlighted.
5. Type in a new name for the sheet and press **Enter** key to commit it.

HIDDING A WORKSHEET

For some reasons you may not want a particular worksheet in your workbook to be visible to everybody who opens that workbook. In such situations, you hide that worksheet.

To Hide a Worksheet:

1. Activate the worksheet you wish to hide.
2. Click the **Home** tab.
3. Click the dropdown arrow under the **Format** menu in the **Cells** group.
4. Hover your mouse pointer on **Hide & Unhide**, a sub-option under the **Visibility** option. Then click on **Hide Sheet**. Excel hides the worksheet so that it is no more visible.
5. Type in a new name for the sheet and press **Enter** key to commit it.

NOTE:

You can also hide a cell, column, rows or selected rows and columns using the same procedure.

UNHIDDING A WORKSHEET

To Unhide a Worksheet You Hid Previously:

1. Click the **Home** tab.
2. Click the dropdown arrow under the **Format** menu in the **Cells** group.
3. Hover your mouse pointer on **Hide & Unhide**, a sub-option under the **Visibility** option. Then click **Unhide Sheet**. Excel displays a list of hidden worksheets.
4. Select the worksheet you wish to unhide and click **OK**.

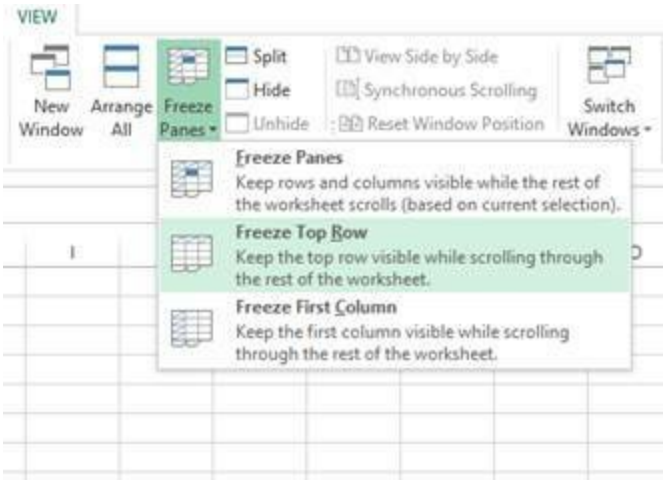
NOTE:
You can also unhide a cell, column, rows or selected rows and columns using the same procedure.

FREEZING A ROW OR COLUMN

If a certain row or column is an object of identification for the rows of your table, you may wish to make it static on the worksheet screen. When you freeze a row or column, Excel moves the column to the extreme left with a thick line separating it from other rows and columns.

To Freeze a Row or Column:

1. Activate the worksheet that you wish to hide its row or column.
2. Click the **View** tab.
3. Click the dropdown arrow under the **Freeze Panes** menu in the **window** group.



4. Click **Freeze top row** or **Freeze first column** depending on your aim**.** Excel freezes the column or row.

UNFREEZING A ROW OR COLUMN

To Unfreeze a Row or Column:

1. Activate the worksheet that you wish to hide its row or column.
2. Click the **View** tab.
3. Click the dropdown arrow under the **Freeze Panes** menu in the **Window** group.

4. Click **Unfreeze panes** depending on your aim**.** Excel unfreezes all previously frozen column or row.

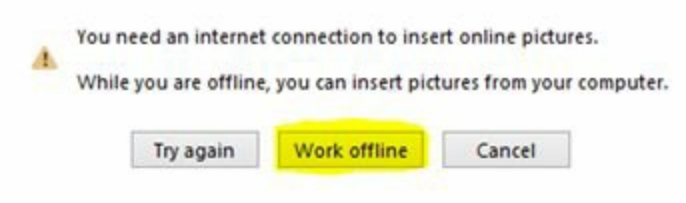
CHANGING YOUR WORKSHEET BACKGROUND

To Change your Worksheet Background:

1. Activate the worksheet you wish to change its background.
2. Click the **Page Layout** tab.
3. Click **Background** menu in the **Page Setup** group. Excel prompts the **Browse sheet background** dialogue box. Select a background picture from your PC and click **Insert**.

NOTE:

In Excel 2013 and 2016, an alert pops up if your PC is offline notifying you that you need an internet connection to us online background picture.



Just click **Work offline** to select background picture from your PC.

USING THE AUTO FILL (FILL HANDLE)

The auto fill is one of the features of Excel used to fill the subsequent cells in a column with respect to the data you entered in the first cell or row. For example, if you wish to fill a particular column with the months of the year or you are performing calculation in a column, all you need to do is type the first month (i.e. January) or type the formula in the first cell depending on your choice, auto fill will fill up the rest of the cells with the correct data.

To Use Auto Fill:

1. Type the first or the formula as the case may be on the first cell and press the **Enter** key.
2. Position the cell pointer on that first cell to make it active.
3. Move the mouse pointer to the lower right corner of the cell pointer (it resembles a square dot). This spot is called a fill handle. Once the mouse pointer reaches this spot, it changes to a small addition sign (+).

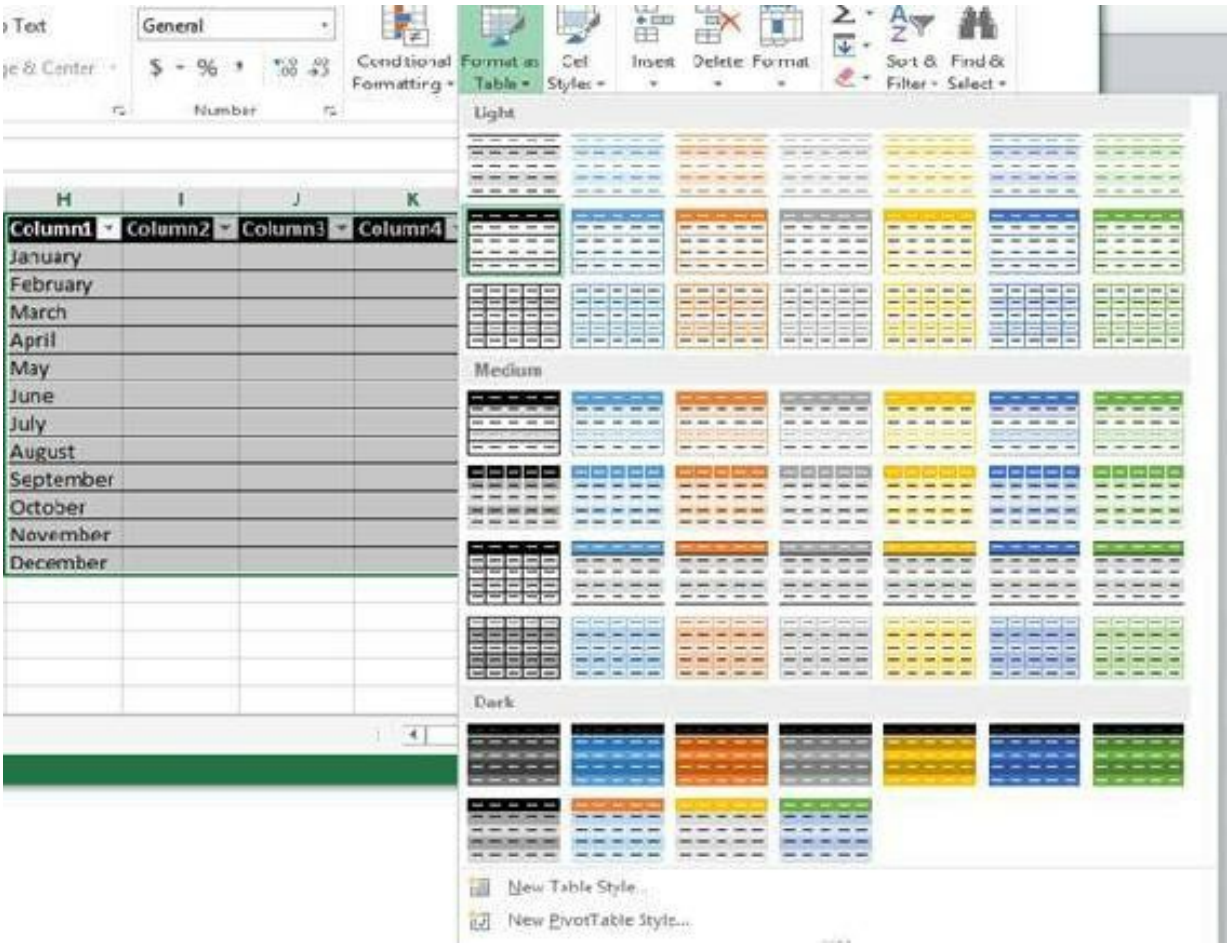
4. Click and drag to highlight all the subsequent cells you wish to auto fill the value, then release the mouse button. Excel fills these cells with the correct data with respect to the data or formula in the first cell as shown below.

CREATING A BORDER OR GRIDLINE

MS-Excel does not create an automatic border around your worksheet. Borders are very necessary especially if you intend to print your work.

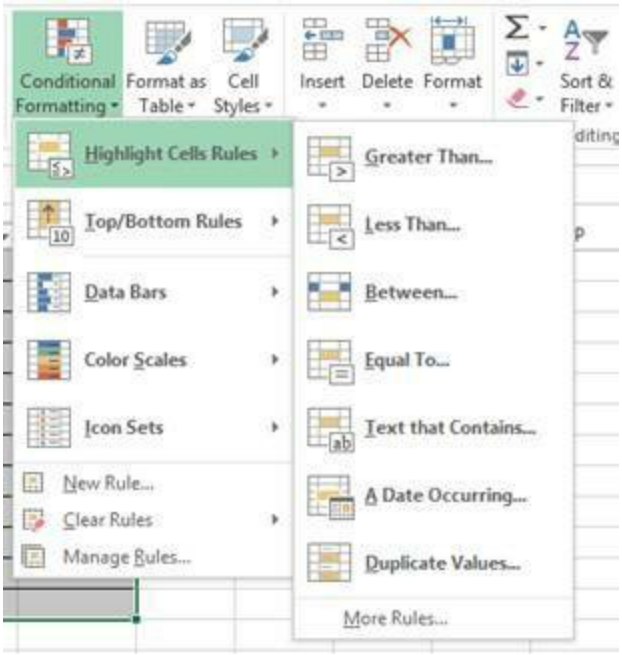
To Create a Border Round your Work:

1. Highlight the entire cells to contain the border
2. Click the **Home** tab.
3. Click the dropdown arrow below **Format as table** menu in the **Styles** group.
4. Then Select any table design of your choice.



USING THE CONDITIONAL FORMATTING

Excel now has a feature that helps you to automatically format cells, rows, columns or group of rows and columns that match a criterion (e.g. cell ranges a particular data type, etc.). The conditional formatting menu is located in the **Styles** group under the **Home** tab. You can choose from the pre-defined rules or create your own rule.

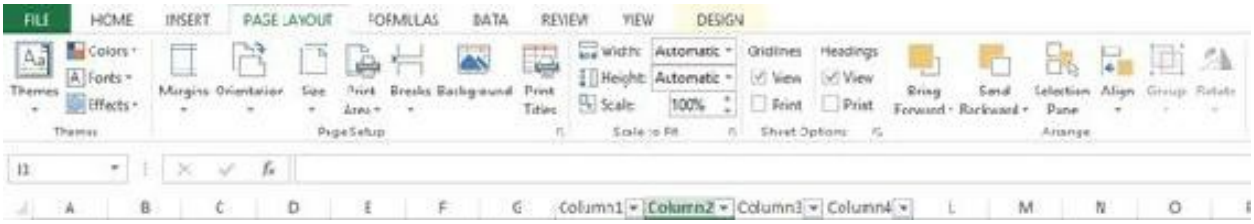


PAGE LAYOUT OPERATION

This operation is very necessary especially for works you intend to print. It configures your wok to fit the printout paper size. You can choose the print themes or templates, margins, orientation size area, etc.

To Layout your Page:

1. Activate the worksheet you wish to print.
2. Click the **Page Layout** tab.
3. Make some necessary adjustments to your work for a neat printout.

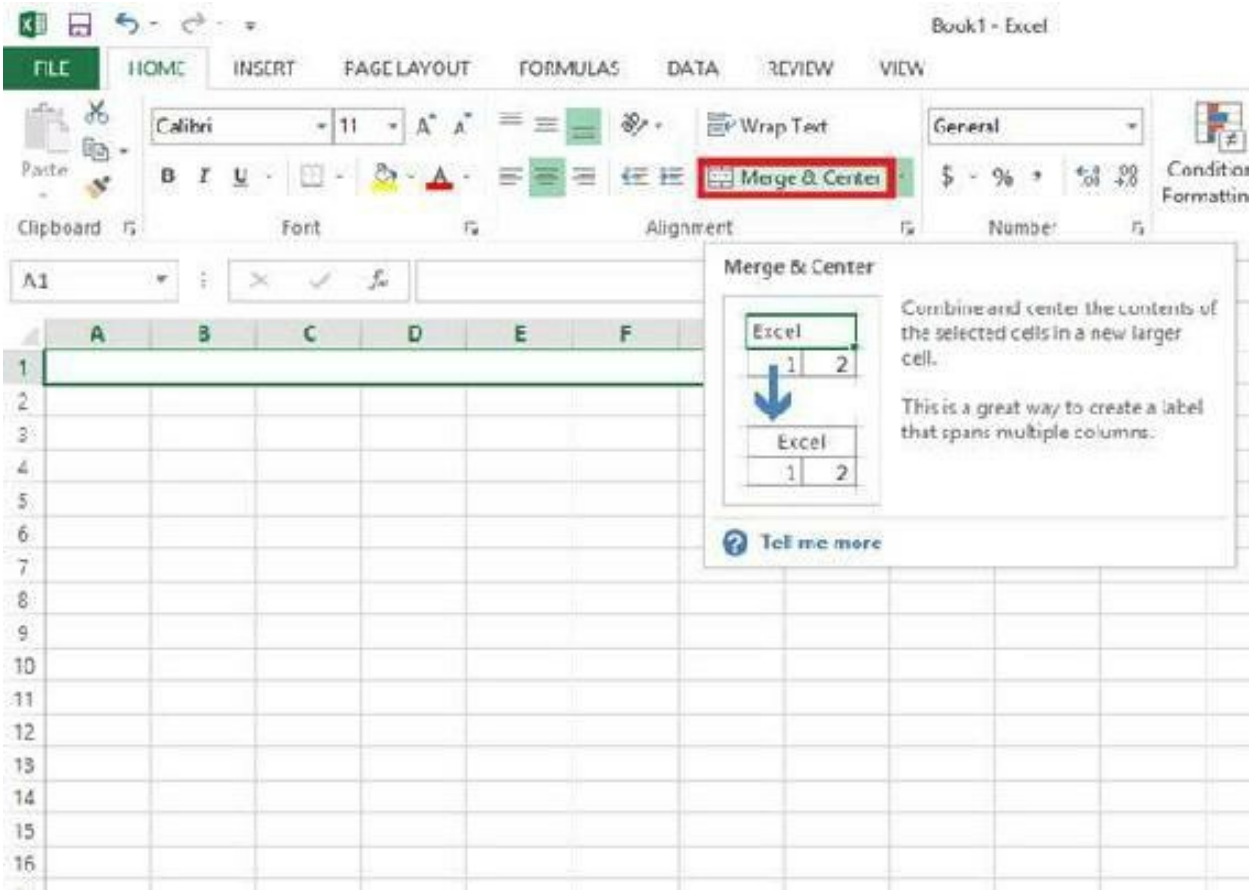


MERGING AND CENTERING YOUR HEADINGS

The merge and center command is used to centralize your titles or headings over cells. It also converts several cells into a single cell and centralized any data in the merged cells. Also note that you should only merge and center empty cells.

To Merge and Centralize a Group of Cells:

1. Highlight the cells you wish to merge.
2. Click the **Home** tab.



3. Click the **merge and cente**r icon in the alignment group. Excel merges those cells to a single cell.
4. Now type in your title in the merged cell. Excel also centralizes your title. In the cell.

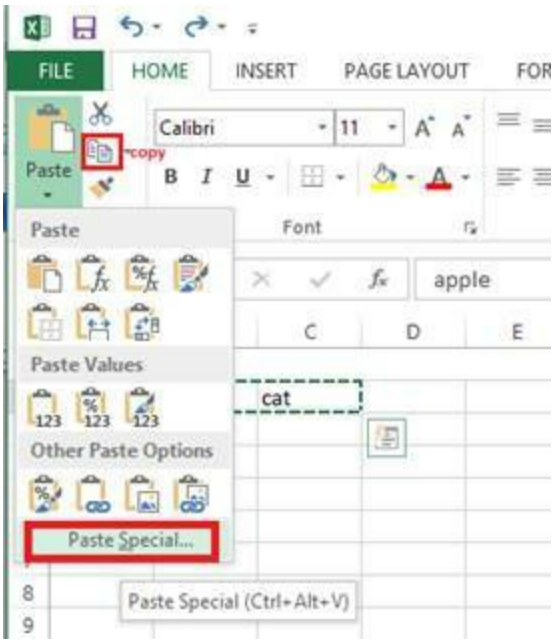
TRANSPOSING YOUR DATA OR INFORMATION

Transposing of data means converting data from column wise to row wise. For example, if you have a data in a particular row which you also need in a particular column, you don't need to retype it. Excel can help you do that easily.

To Transpose Data:

1. Highlight the data you wish to transpose
2. Click the **Home** tab.

3. Click the copy command icon in the **Clipboard** group.
4. Position your cell pointer on the first cell of the column or row you want the data to be.
5. Click the dropdown arrow under the **Paste** command menu icon.
6. Click **Paste Special**.



7. From the resulting options check the **Transpose** sub-option under **Operation** option and click **OK**. Excel transposes the data for you.

SAVING YOUR WORKBOOK FOR THE FIRST TIME (SAVE AS)

To Save your Workbook:

1. Click the **File** tab.
2. Click **Sava As.** This prompts the **Save as** dialogue box.
3. Specify any save location or destination of your choice (e.g. document, desktop).
4. Type the filename you wish to give your workbook and click the **Save** button.

RETRIVING A FILE

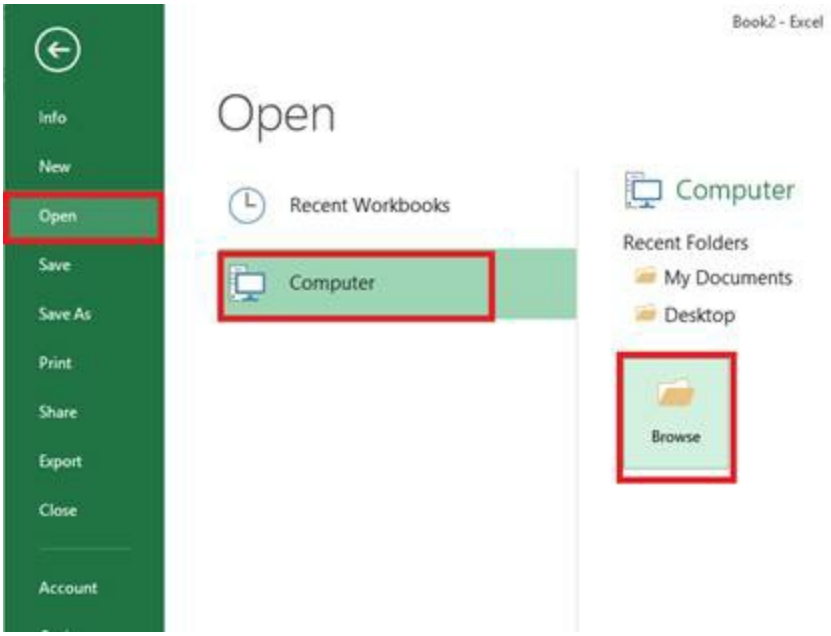
To Retrieve a File you have Previously Created in Excel:

1. Click the **File** tab.

2. Click **Open.** This prompts the **Open** dialogue box.
3. Locate your save location or destination (e.g. document, desktop).
4. Select the file you wish to open by selecting the filename and click the **Open** button.

NOTES:

In Excel 2013 and 2016, you can check some recent files or click **Computer,** then click **browse for file** icon to locate your save location.



HOW TO PASTE SPECIAL IN EXCEL

The paste special command in excel helps you to copy a cell or cells data together with the source formatting and formulas and also updates the cell references in the formulas with reference to the new location.

When you just copy and paste a cell's data to a new location, Excel returns the **#REF** error message because you copied a formula with invalid cell references.

To Copy and Paste Special in Excel:

1. Activate the cell containing the data you want to copy.
2. Right click and click **Copy**.
3. Activate the new cell location (Where you want to paste the copied data).

4. Right click and click **Paste Special** from the resulting menu. Then the Paste Special dialogue box appears.
5. Under **Paste Options** at the top, select **Values** option.
6. Click **Ok**. You should now see the value in the new cell location.

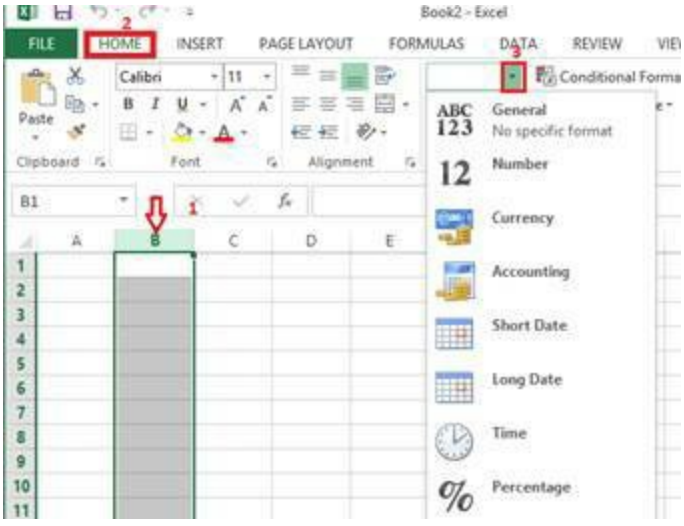
The Paste Special command saves you a lot of time especially when you have a lot of calculated values to paste.

CHOOSING OR CHANGING A DATA FORMAT FOR YOUR COLUMNS

In MS-Excel, you can choose different data format for different columns depending on the type of data to be stored in them. For example you can set date format for a column that stores date data and currency format for a column that stores currency. Other formats include: General, Number, Accounting, Percentage, Scientific, Text, etc. The General format is the default format i.e. when none is specified.

To Choose or Change Data Format for a Column:

1. Activate or highlight the column you wish to choose or change its data format by clicking on the column label e.g. column A, column B, etc.
2. Click the dropdown arrow in the **Number** group located in the **Home** tab pane and select any format of your choice. You can also select different currency types by clicking the dropdown arrow near the dollar sign (**$**) located under the first dropdown arrow in the **Number group** as shown below.



DATA ENTRY

The worksheet accepts two major kinds of data. They include: values and labels.

Labels are titles in form of alphabets in a cell. They are always left justified while values are numbers ranging from 0 to 9. They are always right justified. See the illustration below.

OPERATORS

These are signs or symbols used in MS-Excel to perform calculations and to define criteria or conditions in some functions.

TYPES OF OPERATORS

There are three main types of operators. They include:

- Mathematical or arithmetic operators
- Relational or Comparison operators
- Logical or Conditional operators
- Text operators
- Reference operators

Mathematical or Arithmetic Operators

These are the operators used to perform calculations. They include:

- Addition sign (+) e.g. the formula, =10+5 outputs 15
- Subtraction sign (-) e.g. the formula, =10-5 outputs 5
- Multiplication sign (*) e.g. the formula, =10*5 outputs 50
- Division sign (/) e.g. the formula, =10/5 outputs 2
- Exponential sign (^) e.g. the formula, =10^5 outputs 100000
- Negation sign (-) e.g. the formula, =-10 outputs –10
- Percentage sign (**%**) e.g. the formula, =10% outputs 0.1

Relational or Comparison Operators

These are the operators used to define criteria or conditions in some functions or formulas .They include:

- Equality sign also referred to as Equal to (=) e.g. the formula, =10=5 returns FALSE
- Inequality sign also referred to as Not Equal to (<>) e.g. the formula, =10<>5 returns TRUE
- Greater than (>) e.g. the formula, =5>10 returns FALSE
- Less than (<) e.g. the formula, =10<5 returns FALSE
- Greater than or Equal to (>=) e.g. the formula, =5>=10 returns FALSE
- Less than or Equal to (<=) e.g. the formula, =5<=10 returns TRUE

Logical or Conditional Operators

They are used together with some text and relational operators to define conditions in some functions. They are mainly used in logical functions e.g. **IF** function. Some commonly used ones include:

- AND
- OR
- NOT
- NOR
- NONE

Text Operators

They are used to manipulate text or label cells. Example of a text operator is the ampersand (**&**) operator which is used to concatenate text strings. For example, if you enter the formula **="john"&"son"** into a cell, Excel displays software. Note that the quotation marks and the ampersand aren't shown in the result. You also can use ampersand to combine cells that contain text. For example, if A1 contains the text **Mary** and A2 contains **Johnson**, entering the formula **=A1&" and "&A2** returns **Mary and Johnson**. We will apply this operator in chapter five under **REFERENCING DATA AND FORMULAS IN OTHER WORKSHEETS OF A WORKBOOK**.

Reference Operators

The reference operators combine two cell references or ranges to create a single joint reference. They include:

- **Range** (colon): Produces a range from two cell references for example, **A1:C5**.
- **Intersection** (space): Produces a range that is the intersection of two ranges for example, **A1:C5 B2:E8**.
- **Union** (comma): Produces a range that is the union of two ranges for example, **A1:C5, B2:E8**.

ENTERING A FORMULA

A formula is an expression used to calculate a value. You can enter a formula by typing the expression into the required cell. If the value in a column is calculated using the same formula, you can make use of auto fill or fill handle to reduce the stress of typing in individual cells of the column. You can also enter a formula inside the formula bar by first activating the output cell

Form MS-Excel to treat an expression as a formula, it must begin with an equality sign (=), else, Excel treats it as a text or label. An expression can contain more than one arithmetic operator that applies to either values or cell addresses in a workbook. For example, assuming cell A2 has the value 3 and cell B3 has a value 4, if you wish to perform calculation using these values in another cell, you can type **=3*4** or **=A2*B3** (This is cell referencing, I will elaborate more on it shortly) in the output cell.

ORDER OF PRECEDENCE

This explains the hierarchy of operators, especially mathematical or arithmetic operators in a formula. It is a set of pre-defined rules that MS-Excel follows to unambiguously evaluate a formula by determining the operator to apply first, second, etc. especially in a complex formula. Below is a list of operators and their order of preference in Excel.

- **Range** (:) - 1st
- **Intersection** (<space>) - 2nd
- **Union** (,) - 3rd
- **Negation** (-) - 4th
- **Percentage** (%) - 5th
- **Exponentiation** (^) - 6th
- **Multiplication and Division** (* and /) - 7th
- **Addition and Subtraction** (+ and -) - 8th
- **Concatenation** (&) - 9th
- **Comparison operators** (=, <, >, <=, >=, <>) - 10th

NOTE:

If an expression contains two or more operators with the same level of precedence or hierarchy, Excel applies or evaluates them going from left to right in the expression. You can add parenthesis to change the order of evaluation since parenthesis has the highest precedence, Excel execute any operator enclosed in a parenthesis first.

ILLUSTRATION

1. The expression, **5+3*2** outputs the value, **11** as the result. Because multiplication has precedence over addition, Excel first evaluates **3*2** and then adds **5**.
2. The expression, **4*3/2** outputs the value, **6** as the result. The two operators have the same level of precedence, so Excel evaluates the expression going from left to right i.e. multiplication before addition.
3. The expression **(5+3)*2** outputs the value, **16** as the result. Although multiplication has precedence over addition, addition was evaluated first because it is enclosed in parenthesis, which has the highest precedence.

TYPES OF FORMULA IN RELATION TO CELL REFERENCING

Categorizing formulas with respect to cell referencing, there are three types of formula. They include:

RELATIVE CELL REFERENCE FORMULA

This is the type of formula in which the cell references or addresses in it change with respect to new location. For example, if you copy a formula that contains a relative cell address, **A5** to a new location, say three rows down and five columns to the right, the relative cell address, **A5** in the formula changes to **F8.** It is activated by default.

ABSOLUTE CELL REFERENCE FORMULA

In this type of formula, the cell references or addresses in the formula does not change with respect to a new location. To create an absolute cell reference in a formula, you prefix the column and row designation with a dollar sign (**$**).This tells Excel that you want to use an absolute reference.

When you refer to a cell in a formula using the absolute reference format, Excel uses the physical address of the cell. For example, Excel interprets the formula **=$A$1*2** as "Multiply the contents of cell **A1** by 2." No matter where you copy or move this formula, the cell reference doesn't change. The cell address is said to be anchored.

MIXED CELL REFERENCE FORMULA

In this type of formula, the precedent cell (another cell address in a formula) has the characteristics of both relative and absolute cell reference.

For example, a mixed cell reference for cell A5 would either be written as **$A5** or **A$5**. In the case of **$A5,** the row reference would shift, but the column reference would not shift when the formula is copied to a new location. In the case of **A$5**, only the column reference will shift if the formula is copied to a new location.

NOTE:

You can switch between absolute relative or mixed cell reference in a formula

by selecting the formula and then pressing the **F4** key on your keyboard repeatedly.

FUNCTION AND MS-EXCEL BUILT-IN WORKSHEET FORMULAS

A function is a named block of code that performs a specific task, possibly acting upon a set of values given to it, or *parameters*, and possibly returning a single value. It is a sequence of values, cell references, names, functions, or operators in a cell that together produce a new value. A formula always begins with an equality sign (=).

Regardless of their source, all functions are evaluated in the same way. In MS-excel and some programming languages, a function takes the format:

=*function_name* ([parameter [,...]]).

Excel built-in worksheet functions are specialized formulas or functions that are embedded in MS-Excel which enables the user to perform calculations easily and automatically.

PARTS OF BUILT IN FUNCTIONS

There are three parts of functions in MS-Excel. They include:

1. **EQUALITY SIGN** (=):
   It tells Excel that you want to perform a calculation.
2. **FUNCTION PARAMETER OR ARGUMENT:**
   This specifies the range of data you want to calculate or the values the function requires to evaluate correctly. The number of parameters a function requires differs from function to function (and, as we'll see later, may even vary for the same function).
   The parameters or argument supplied to the function may be any valid expression and should be in the specific order expected by the function. They are values that provides information to an action, an event, a method, a property, a function, or a procedure.
   A function's documentation will tell you what parameters the function expects and what values you can expect to be returned. It must be enclosed in parenthesis.
3. **FUNCTION NAME**:
   When you type an equality sign followed by the function name of a built-in function in Excel, it will brief you about the function and the type of parameters needed by a function.

CATEGORIES OF MS-EXCEL BUILT-IN WORKSHEET FORMULAS / FUNCTIONS

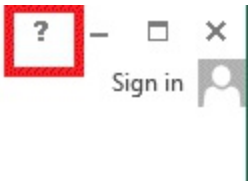
MS-Excel built-in functions have about thirteen (13) main categories. They include:

- Compatibility functions
- Cube functions
- Database functions
- Date and time functions
- Engineering functions
- Financial functions
- Information functions
- Logical functions
- Lookup and reference functions
- Math and trigonometry functions
- Statistical functions
- Text functions
- User defined functions that are installed with add-ins

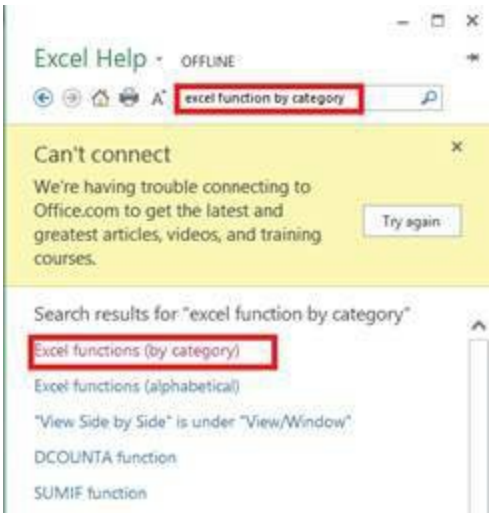
HOW TO SEARCH FOR MS-EXCEL FUNCTIONS AVAILABLE TO YOUR OWN VERSION

The function types under each category vary with respect to the version of MS –Excel you are using. To view a list of the functions available in your version of Excel:

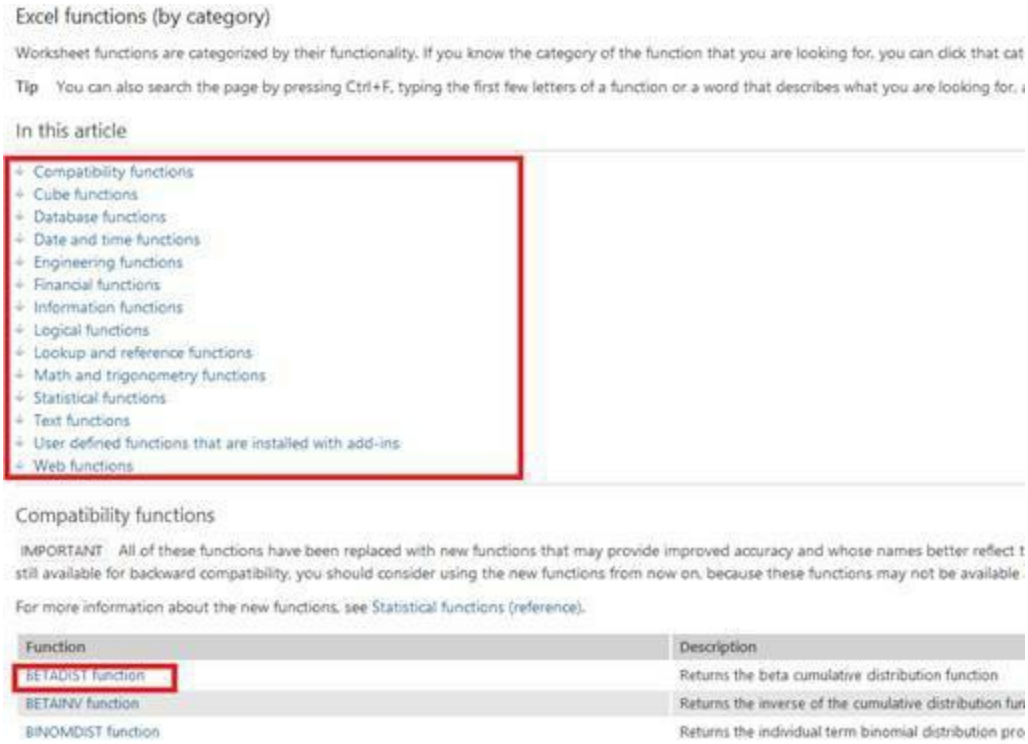
1. Open MS-Excel. Locate and click the Excel **Help** icon (**?**). It is normally located the window control box.



2. This opens the MS-Excel **Help** window. Type **Excel function by category** in the search bar and press the **enter** key.
3. From the search result, click the **Excel functions (by category)** link as shown below.



4. Excel **Help** displays links to the worksheet function categories. Click any of the links to see all the functions under that category. You can also click any function to learn more about it.



EXCEL FUNCTION KEYS

These are the special keys used in MS-Excel to issue a command or order without going through the normal procedure i.e. they provide shortcuts and save time. These keys range from **F1** to **F12.** They include:

1. **F1 (HELP AND SUPPORT)**
   This key helps you to get help from windows or internet about any command or topic of your choice.
2. **F2 (EDIT)**
   This key is used to edit the contents of an active cell.
3. **F3 (NAME)**
   This key is used to create or display created range of names so as to paste any of them into a formula.
4. **F4 (ABSOLUTE)**
   This key is used to create an absolute cell in a formula.
5. **F5 (GO TO)**
   This key is used to move the cell pointer to the specified address.
6. **F6 (WINDOW)**
   This key is used to move the cell pointer from one worksheet window to another any time the worksheet window is split into two or more windows
7. **F7 (SPELLING)**
   This key is used to spell check a worksheet content.
8. **F8 (SELECTION)**
   This key is used to extend selection.
9. **F9 (CALCULATION)**
   This key is used to calculate all the worksheet opened in a workbook.
10. **F10 (MENU BAR)**
    This key is used to activate the menu bar.
11. **F11 (CHART)**
    This key is used to create an automatic chart in the selected or activated worksheet.
12. **F12 (SAVE AS)**
    This key is used to save a new workbook for the first time or save an existing worksheet as a new workbook.

MS-EXCEL ERROR MESSAGES, CAUSES, SOLUTIONS AND SOME ERROR DEBUGGING FUNCTIONS

These are error messages or alerts that displays when it discovers an error in a formula or cell address. They include the following:

1. **#REF!**
   Excel displays this error message when a cell address or reference is not valid i.e. deleting cells referred to by other formulas.
   Solution: Click **undo** from the quick access tool bar of press the **Ctrl** + **Z** keys.
2. **#NAME?**
   Excel displays this error message when the name of a function is mis spelt.
   Solution: Correct the spelling.
3. **DIV/0!**
   Excel displays this error message when it tries to divide by zero or if a referenced cell is blank when it is required to have a value.
   Solution: Fix the formula if it is referring to the wrong cell or fix data in the reference cell.
4. **#N/A**
   This error message means **Not Available**. Excel inserts this error value in the active cell when you have improperly used some certain function argument.
   Solution: Check the formula of function argument you are using.
5. **######**
   Excel inserts this error value in the current cell that contains a value wider than the sell width.
   Solution: Adjust or increase the column width.
6. **#NUM**
   Excel displays this error message when you try to use an unacceptable numeric argument such as calculating the square root of a negative number.
   Solution: Change the sign of the value to positive.
7. **#VALUE!**

This error message is displayed when the wrong type of argument or operand is used. For example, entering a text when the formula requires a number or logical value or operator.
Solution: Ensure that the formula contains the correct argument.

8. **#NULL!**
This error message is displayed when you join two areas that should be separated.
Solution: Use a comma sign (**,**) to separate the areas.

SOME ERROR DEBUGGING FUNCTIONS

These are some Excel built-in functions that are used to handle errors. They are also used to instruct MS-Excel how, when and which error message to display. Some commonly used ones are:

- **ERROR.TYPE function**
This function returns a number corresponding to one of the error values in Microsoft Excel or returns the #N/A error if no error exists. You can use ERROR.TYPE in an IF function to test for an error value and return a text string, such as a message, instead of the error value.
Syntax: **=ERROR.TYPE(error_val)**

The ERROR.TYPE function syntax has the following arguments:
Error_val (required): This is the error value whose identifying number you want to find. Although error_val can be the actual error value, it will usually be a reference to a cell containing a formula that you want to test.
If error_val is #NULL! ERROR.TYPE returns **1**
If error_val is #DIV/0! ERROR.TYPE returns **2**
If error_val is #VALUE! ERROR.TYPE returns **3**
If error_val is #REF! ERROR.TYPE returns **4**
If error_val is #NAME? ERROR.TYPE returns **5**
If error_val is #NUM! ERROR.TYPE returns **6**
If error_val is #N/A ERROR.TYPE returns **7**
If error_val is #GETTING_DATA ERROR.TYPE returns **8**
If error_val is anything else ERROR.TYPE returns **#N/A**
- **IFERROR function**

This function returns a value you specify if a formula evaluates to an error; otherwise, returns the result of the formula. Use the IFERROR function to trap and handle errors in a formula.

Syntax: IFERROR(value, value_if_error)

The IFERROR function syntax has the following arguments (argument: A value that provides information to an action, an event, a method, a property, a function, or a procedure.):

Value Required: The argument that is checked for an error.

Value_if_error (required). The value to return if the formula evaluates to an error. The following error types are evaluated: #N/A, #VALUE!, #REF!, #DIV/0!, #NUM!, #NAME?, or #NULL!.

REMARKS:

If Value or Value_if_error is an empty cell, IFERROR treats it as an empty string value ("").

If Value is an array formula, IFERROR returns an array of results for each cell in the range specified in value.

NOTE:

For a clearer, detailed explanation of these error messages and error debugging built-in functions with illustration, click the **Help** icon, located top right near the window control box. Type the name of the error message in the search bar e.g. **#REF** or **IFERROR Function** and press the **Enter** key. Click the error message article link to see full details.

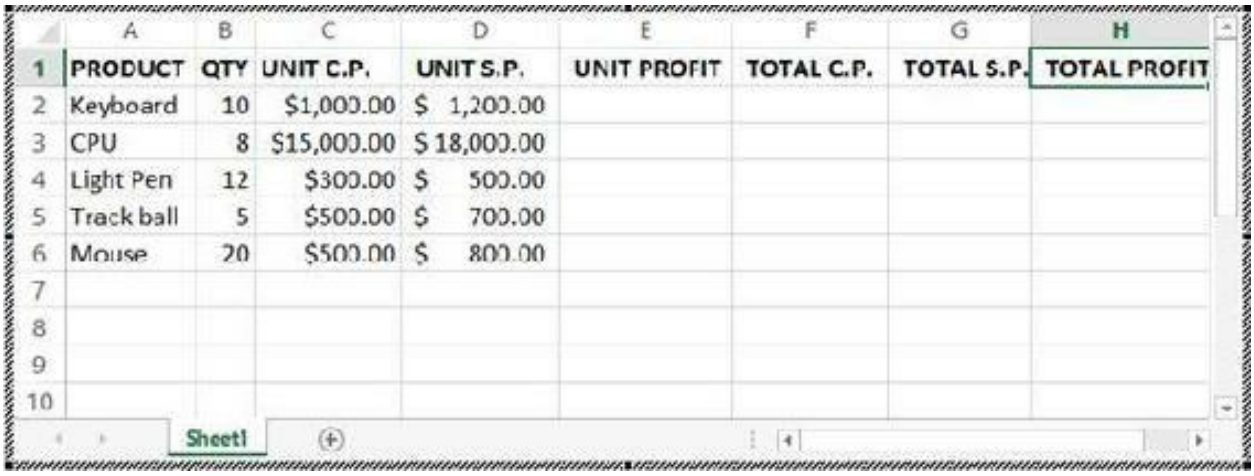
BUSINESS APPLICATIONS OF SOME MS-EXCEL ARITHMETIC OR MATHEMATICAL FUNCTIONS

In this section, I will show you the practical business application of some Excel arithmetic functions.

PRACTICAL ILLUSTRATIONS

Please try to study and practise these illustrations at your convenience.

SALES REPORT



	A	B	C	D	E	F	G	H
1	PRODUCT	QTY	UNIT C.P.	UNIT S.P.	UNIT PROFIT	TOTAL C.P.	TOTAL S.P.	TOTAL PROFIT
2	Keyboard	10	$1,000.00	$ 1,200.00				
3	CPU	8	$15,000.00	$ 18,000.00				
4	Light Pen	12	$300.00	$ 500.00				
5	Track ball	5	$500.00	$ 700.00				
6	Mouse	20	$500.00	$ 800.00				
7								
8								
9								
10								

Sheet1

From the table above, calculate:

1. Unit profit for each product
2. Total cost price for each product
3. Total selling price for each product
4. Total profit for each product

SOLUTION

Create the table in Excel. You may wish to place the title **SALES REPORT** in the first row by first merging the cells in the row. Note that your cell reference and mine will vary because you have moved a row down. i.e. if my formula contains the cell address **B2**, your will now be **B3**. You can also specify the data format for each column.

Type the following formulas in the appropriate columns as indicated.

1. TOTAL COST PRICE=**D2-C2** press **Enter** key i.e. **UNIT S.P.** minus

UNIT C.P.

NOTE:

You can specify the cell references by clicking the appropriate cells. For example, for the formula above, type the equality sign, then click on cell D2 followed by minus sign, then click on cell C2 and press the enter key. Use the auto fill or fill handle to fill the subsequent cells of the column.

2. TOTAL COST PRICE=**B2*C2** press **Enter** key i.e. **QTY*UNIT C.P.**
3. TOTAL SELLING PRICE=**B2*D2** press **Enter** key i.e. **QTY*UNIT S.P.**
4. TOTAL PROFIT=**B2*E2** press **Enter** key i.e. **QTY*UNIT PROFIT.**

Below is the complete table. Yours should look like this if got everything right.

	A	B	C	D	E	F	G	H
1	PRODUCT	QTY	UNIT C.P.	UNIT S.P.	UNIT PROFIT	TOTAL C.P.	TOTAL S.P.	TOTAL PROFIT
2	Keyboard	10	$1,000.00	$ 1,200.00	$200.00	$10,000.00	$12,000.00	$2,000.00
3	CPU	8	$15,000.00	$ 18,000.00	$3,000.00	$120,000.00	$144,000.00	$24,000.00
4	Light Pen	12	$300.00	$ 500.00	$200.00	$3,600.00	$6,000.00	$2,400.00
5	Track ball	5	$500.00	$ 700.00	$200.00	$2,500.00	$3,500.00	$1,000.00
6	Mouse	20	$500.00	$ 800.00	$300.00	$10,000.00	$16,000.00	$6,000.00
7								
8								
9								
10								

Sheet1

Now let us go over to the second practical illustration.

PERCENTAGE DISCOUNT

	A	B	C	D	E
1	PRODUCT	QTY	UNIT C.P.	5% DISCOUNT	ACTUAL UNIT C.P.
2	Web cam	3	$450.00		
3	Voice input	2	$750.00		
4	Optical	4	$250.00		
5	Digital cam	7	$850.00		
6	Scanner	6	$750.00		
7					
8					
9					
10					

Sheet1

From the table above, calculate the:

1. Discount received
2. Actual unit cost price

SOLUTION

Create the table in Excel. You may wish to place the title **PERCENTAGE DISCOUNT** in the first row by first merging the cells in the row. Note that your cell reference and mine will vary because you have moved a row down. i.e. if my formula contains the cell address **B2**, your will now be **B3**. You can also specify the data format for each column.

Type the following formulas in the appropriate columns as indicated.

1. DISCOUNT RECEIVED **=C2*5% enter** key.
2. ACTUAL UNIT COST PRICE **=C2-D2 enter** key.

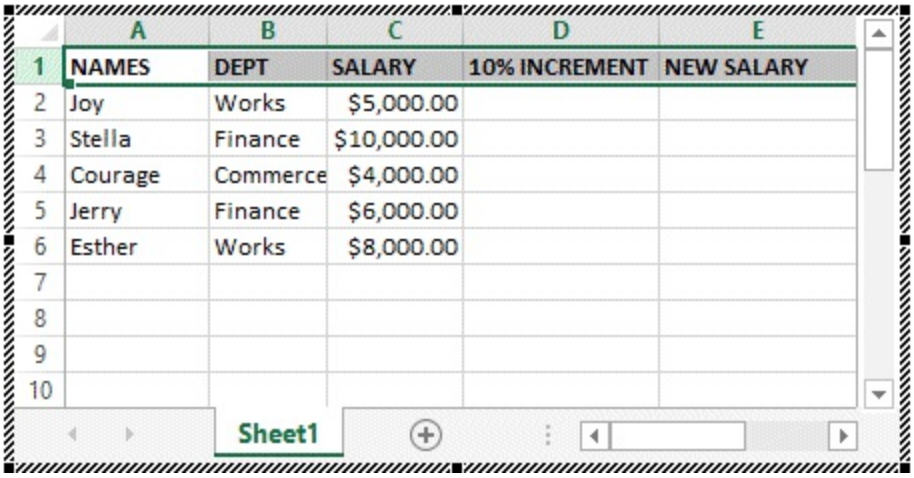
Below is the complete table. Yours should look like this if got everything right.

	A	B	C	D	E
1	PRODUCT	QTY	UNIT C.P.	5% DISCOUNT	ACTUAL UNIT C.P.
2	Web cam	3	$450.00	22.5	$427.50
3	Voice input	2	$750.00	37.5	$712.50
4	Optical	4	$250.00	12.5	$237.50
5	Digital cam	7	$850.00	42.5	$807.50
6	Scanner	6	$750.00	37.5	$712.50
7					
8					
9					
10					

Sheet1

Now let us go over to the second practical illustration.

PERCENTAGE INCREMENT



	A	B	C	D	E
1	NAMES	DEPT	SALARY	10% INCREMENT	NEW SALARY
2	Joy	Works	$5,000.00		
3	Stella	Finance	$10,000.00		
4	Courage	Commerce	$4,000.00		
5	Jerry	Finance	$6,000.00		
6	Esther	Works	$8,000.00		
7					
8					
9					
10					

Sheet1

From the table above, calculate the:

1. 10% salary increment
2. The new salary

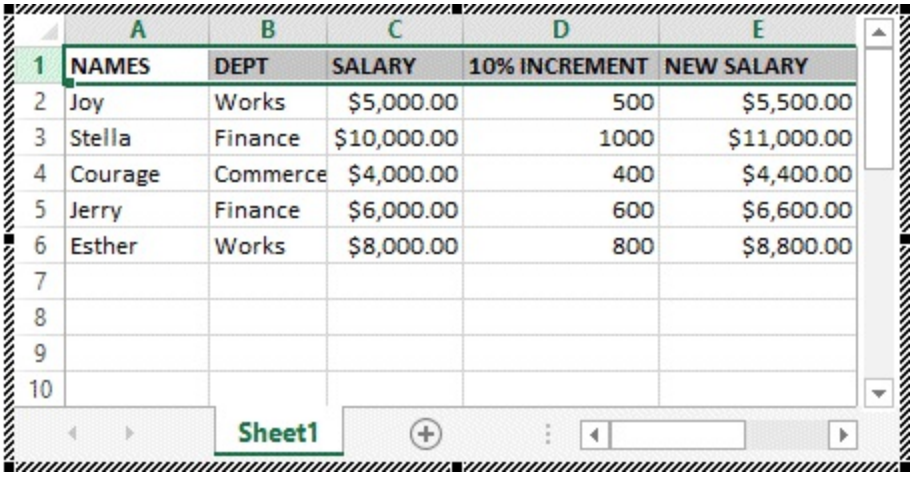
SOLUTION

Create the table in Excel. You may wish to place the title **PERCENTAGE INCREMENT** in the first row by first merging the cells in the row. Note that your cell reference and mine will vary because you have moved a row down. i.e. if my formula contains the cell address **B2**, your will now be **B3**. You can also specify the data format for each column.

Type the following formulas in the appropriate columns as indicated.

1. DISCOUNT RECEIVED **=C2*10% enter** key.
2. ACTUAL UNIT COST PRICE **=C2+D2 enter** key.

Below is the complete table. Yours should look like this if got everything right.



	A	B	C	D	E
1	NAMES	DEPT	SALARY	10% INCREMENT	NEW SALARY
2	Joy	Works	$5,000.00	500	$5,500.00
3	Stella	Finance	$10,000.00	1000	$11,000.00
4	Courage	Commerce	$4,000.00	400	$4,400.00
5	Jerry	Finance	$6,000.00	600	$6,600.00
6	Esther	Works	$8,000.00	800	$8,800.00
7					
8					
9					
10					

Sheet1

In the next chapter, I will explain about sorting a database and charts

PRACTICE EXERCISES

1.

a. What is an electronic spreadsheet?
b. List any five spreadsheet package you know

2. Briefly explain the following:

a. Workbook
b. Worksheet
c. Cell
d. Cell address
e. Cell pointer

3. Define operators and list the types of operators
4. Explain briefly with good illustrations, order of precedence
5.

a. What are MS-Excel built-in formulas?
b. List the categories of Excel built formulas

6. Write and explain the built-in functions to perform the following:

a. 2+4+6+10
b. 2*4*6*10
c. A1+B1+C1/3
d. C5^2

7. Explain the functions of the following function keys in MS-Excel

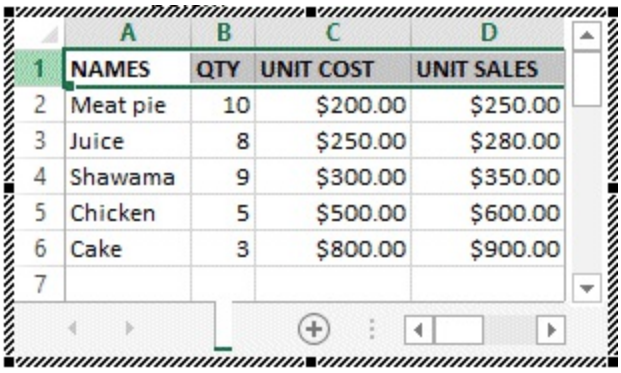
a. F2
b. F5
c. F7
d. F10
e. F11

8. Explain the causes of the following error messages and their solution.

a. #VALUE!
b. #REF!
c. #####
d. #NUM!

9.

a. Prepare a sales report or Mr. Biggs fast food with the following table information below



	A	B	C	D
1	NAMES	QTY	UNIT COST	UNIT SALES
2	Meat pie	10	$200.00	$250.00
3	Juice	8	$250.00	$280.00
4	Shawama	9	$300.00	$350.00
5	Chicken	5	$500.00	$600.00
6	Cake	3	$800.00	$900.00
7				

b. As spreadsheet manager, calculate the following:

i. Unit profit
ii. Total cost
iii. Total sales
iv. Total profit
v. Calculate the discount of 5% on each sale
vi. Calculate the actual selling price
vii. Calculate the new profit
viii. Calculate the total discount.

CHAPTER 2: DATABASE OPERATIONS IN MS-EXCEL

SORTING A DATABASE

This is the arrangement of records either in ascending or descending order for easy accessibility and retrieval of information. Sometimes there might be need for you to arrange records alphabetically, and then you sort the database. You can sort by any column of your choice.

DEFINITION OF TERMS

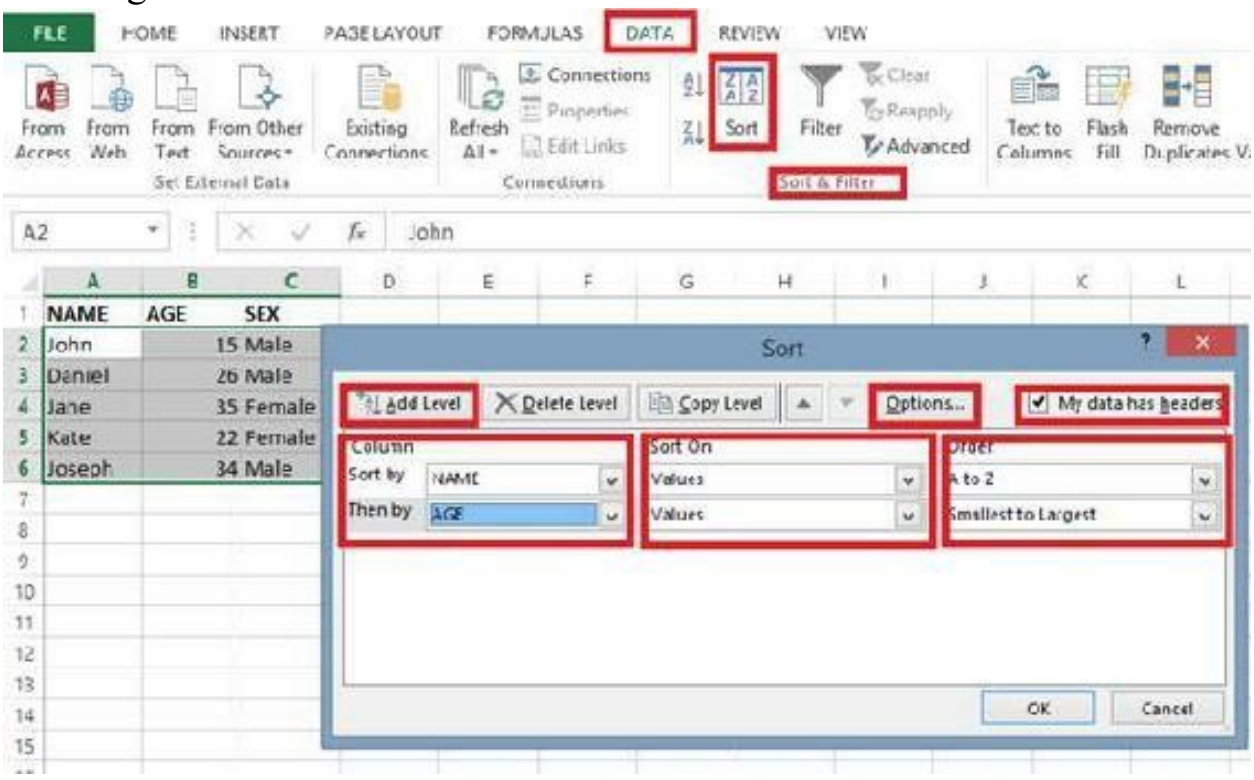
These are some of the database terms we will be using in this chapter.

1. **DATA:**
   They are raw or unprocessed facts concerning individuals or business organizations.
2. **CHARACTER:**
   This is the smallest entry in a database. A collection of characters is called a field or data item. For example A, B, C,…, Z or 0, 1, 2,…,9.
3. **INFORMATION:**
   It is also referred to as processed data. It is slightly different from data.
4. **FIELD:**
   This is a unit of information which forms the attribute of a record. It can also be referred to as Data Items.
5. **FIELD NAMES:**
   This is the column title or heading that specifies the type of data to be stored in a column or field. For example FIRST NAME, SURNAME, etc.
6. **RECORD:**
   This is the collection of related fields. It is commonly expressed in rows.
7. **DATABASE:**
   This is a collection of related records that contain information of individuals or entities which are organized structurally to enhance easy access, update, maintenance and storage with minimum redundancy.
8. **SORTING FIELD:**
   This is the field the sorting operation is based on.
9. **SORTING ORDER:**
   This is the order of the sorting operation it could be either in ascending or descending order or group of colour range, etc.
10. **DATA RANGE:**
    This is the entire database you want to sort which includes all the records excluding the field names.
11. **CRITERIA:**
    These are the conditions you use to tell Excel how it will query or sort your database.

HOW TO SORT A WORKSHEET OR DATABASE

To Sort a Database:

1. Open the records or database you want to sort.
2. Click the **Data** tab and click **Sort** under **Sort & Fill** group. This prompts the sort dialogue box.
3. If your data has a header row, check the button at the top that says "My Data has a header". Specify the sorting column by clicking the "Sort by" drop down menu under **Column**. You can sort by more than one column by clicking the "Add level" tab. This will add a second sort level. In the figure shown below, there are two levels: sort by NAME and then by Age.



4. The "Sort On" drop down menu has many options such as **values**, **cell colour**, **font colour, cell icon**. Specify the sort criteria by clicking the drop down menu under "Sort On". The default is **Values**.
5. Then specify the sort order in the "Order" drop down menu. The options see is determined by the option you chose under the "sort on" drop down menu. For example if you chose to sort by values, you can either sort in ascending or descending order. If you chose to sort by cell colour, you

will see a drop down menu of all the cell colours you used.

6. If you want some advanced options like sorting from left to right i.e. row wise or case sensitive sorting, click the “Options” button and check the two desired buttons. Below is a figure of a sort result.

	A	B	C
1	**NAME**	**AGE**	**SEX**
2	Daniel	26	Male
3	Jane	35	Female
4	John	15	Male
5	Joseph	34	Male
6	Kate	22	Female
7			

NOTE:

The first sort criterion (i.e. the first sort column) has precedence over the second and subsequent ones.

QUERYING A DATABASE

This operation is used to extract or search for specific information from a large volume of records in a database based on the specified criteria. This operation is very useful especially if there are so many records in a database and you wish to only the records that met the specified criteria. To achieve such tasks manually would take much of your time because you have to skim and scan through the record. But with the query or filter operation in MS-Excel, the task will be achieved within few minutes.

METHODS OF QUERYING A DATABASE IN MS-EXCEL

There are two methods of querying a database in MS-Excel. They include:

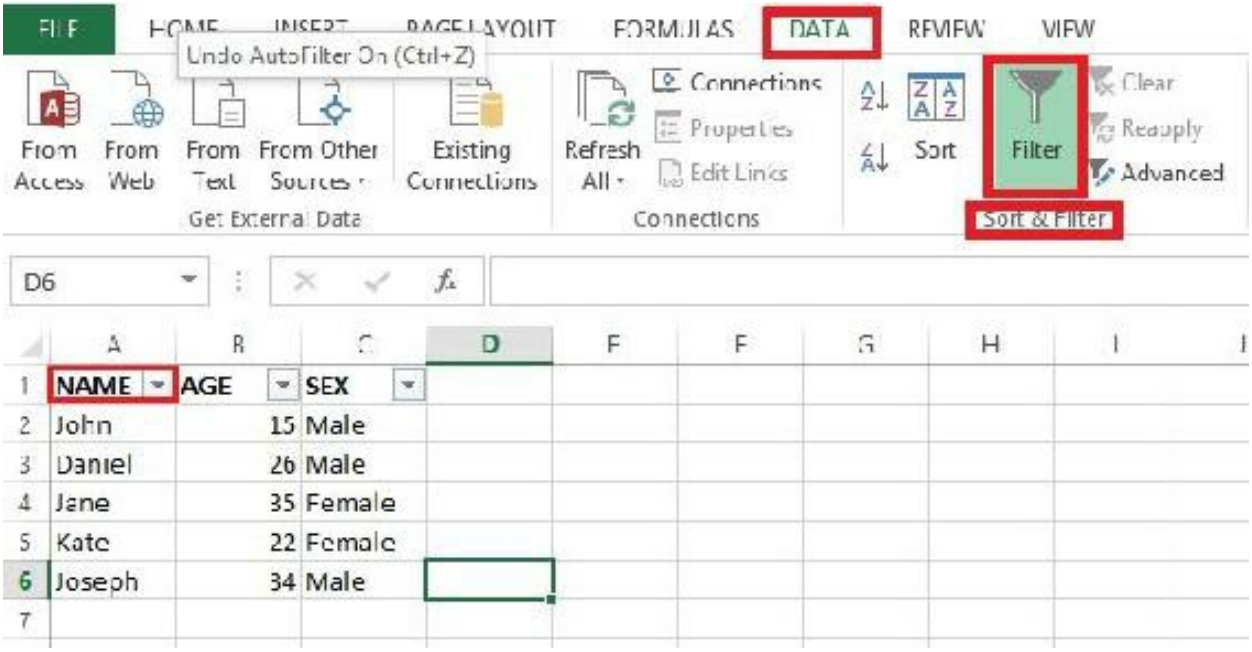
- **SIMPLE METHOD – Auto filter command**
- **ADVANCED METHOD – Advance filter command**

SIMPLE METHOD – Auto filter command

This is the simplest and automatic method of querying a database in Excel.

To Filter or Query a Database Using Auto Filter Command:

1. Prepare and open the database you want to query or filter.
2. Position the cell pointer anywhere within the data range.
3. Click the **Home** tab.
4. Click the **Data** tab and click **Filter** under **Sort & Fill** group. Excel will automatically insert drop down arrow on each column title as shown below.



5. Click on any drop down arrow to specify your conditions or criteria. As you set these criteria, excel automatically removes the records that did not meet the criteria, leaving only those that met it.

NOTE:

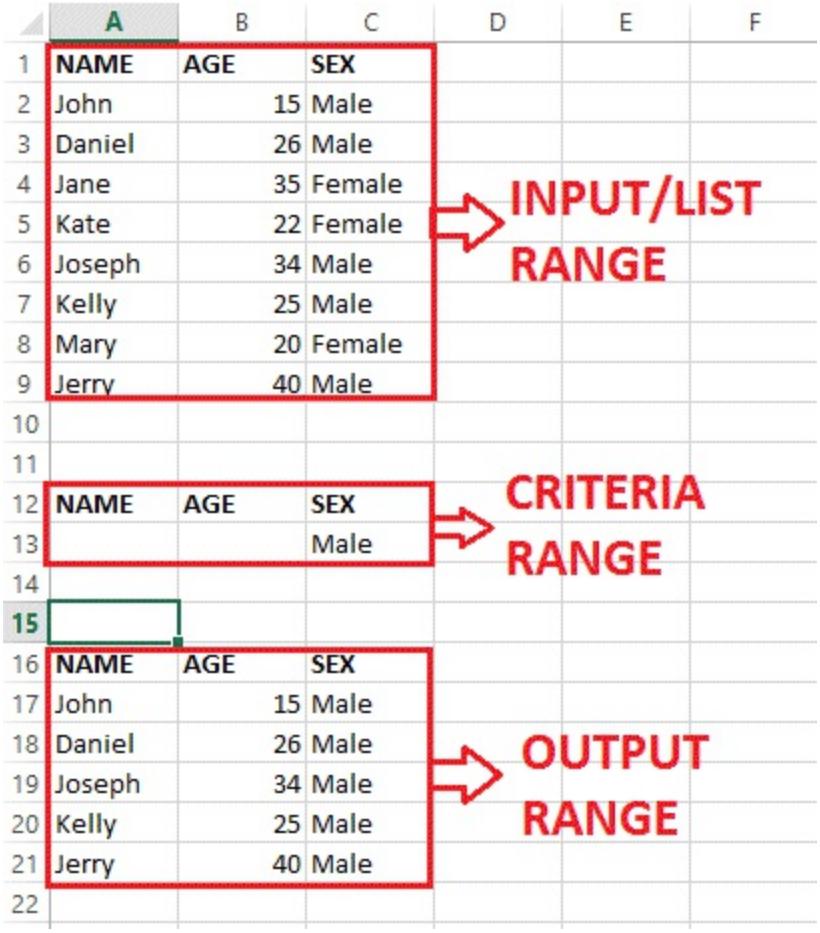
This method allows you to set only one criterion at a time. If you set more than one criteria, Excel will only list the records that met the last criterion you set.

THE ADVANCED METHOD – Advance filter command

This is the best method of querying a database because Excel allows you to specify more than one criterion at the same time. In this method three ranges of data must be prepared. They include:

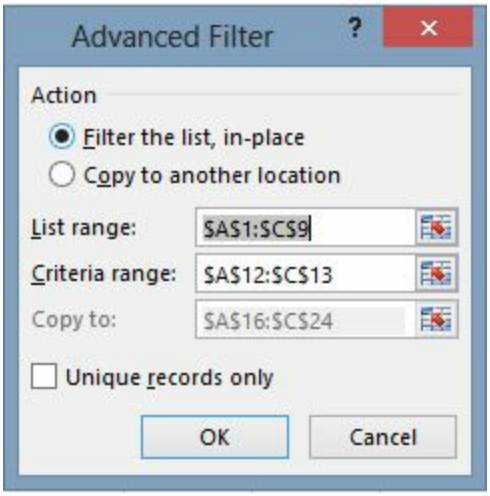
- **LIST/INPUT RANGE:**
  This range specifies the location of the entire database which includes all the records as well as their column or field names.
- **CRITERIA RANGE:**
  This range is where you specify the conditions which MS-Excel will use to search for the records that in the list/input range that met the specified conditions.
  The first row of this range contains copies of the field names from the input range and is about one to two blank rows from the output range.
- **OUTPUT RANGE:**
  This range is where Excel pastes copies of records in the input range that

met the criteria specified in the criteria range.
The first row of the output range contains copies of the field names from the input range and then several rows of result records. The worksheet in the figure below specifies the three ranges.



To Filter or Query a Database Using Advance Filter Command:

1. Prepare the three ranges of data as shown above.
2. Type in the conditions under the criteria range.
3. Position your cellpointer anywhere within the input range.
4. Click the **Data** tab and click **Advanced** under **Sort & Fill** group. This prompts the advanced filter dialogue box.



5. Click on the collapse button at the right end of the list range text box. This takes you to your worksheet.
6. Specify the list range by highlighting the entire input range i.e. the database or entire record and then click on the icon again to go back to the dialogue box.
7. Specify the criteria range by highlighting the entire criteria range and then click on the collapse button again to go back to the dialogue box.
8. Check the "Copy to another location" bullet under "**Action".**
9. Specify the output range by highlighting the entire output range and then click on the collapse button again to go back to the dialogue box.
10. Click **OK**.

Excel now copies the records that met the criteria you set in the criteria range to the output range.

CHARTS AND CHART OPERATIONS IN MS-EXCEL

A chart is a tool you can use in MS-Excel to represent your worksheet graphically. A chart makes data analysis interesting and easy. When you create a chart based on a work sheet selection, MS-Excel uses the values from the worksheet and presents them in a chart as data points which are represented by bars, lines, columns dots , etc. these shapes are referred to as DATA SERIES.

A chart is the best way to communicate trends in a large collection of data because it summarizes data visually. In addition to the standard charts. You have a great deal of control over your charts' appearance—you can change the color of any chart element, choose a different chart type to better summarize the underlying data, and change the display properties of text and numbers in a chart. If the data in the worksheet used to create a chart represents a progression through time, such as sales over several months, you can have Excel extrapolate future sales and add a trend line to the graph that represents that prediction.

HOW TO CREATE A CHART IN MS EXCEL

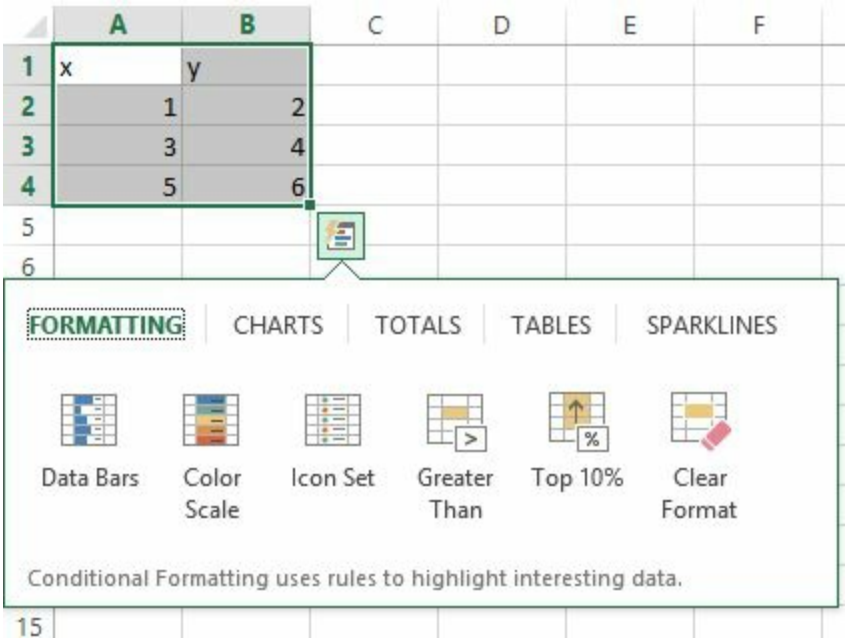
There are mainly two ways of creating charts in MS-Excel. They include:

SHORTCUT - USING THE QUICK ANALYSIS TOOL

The quick analysis tool is used to quickly and easily analyze your data with some of Excel's most useful tools such as charts, color-coding and formulas. This tool saves some time and displays recommended charts to summarize your data.

To Create a Chart Using the Quick Analysis Tool:

1. Select the entire data range you want to chart including the column titles.
2. Click the **Quick Analysis** button and then click **Charts** as shown below to display the types of charts that Excel recommends.



You can display a live preview of each recommended chart by pointing to the icon that represents that chart. Clicking the icon adds the chart to your worksheet.

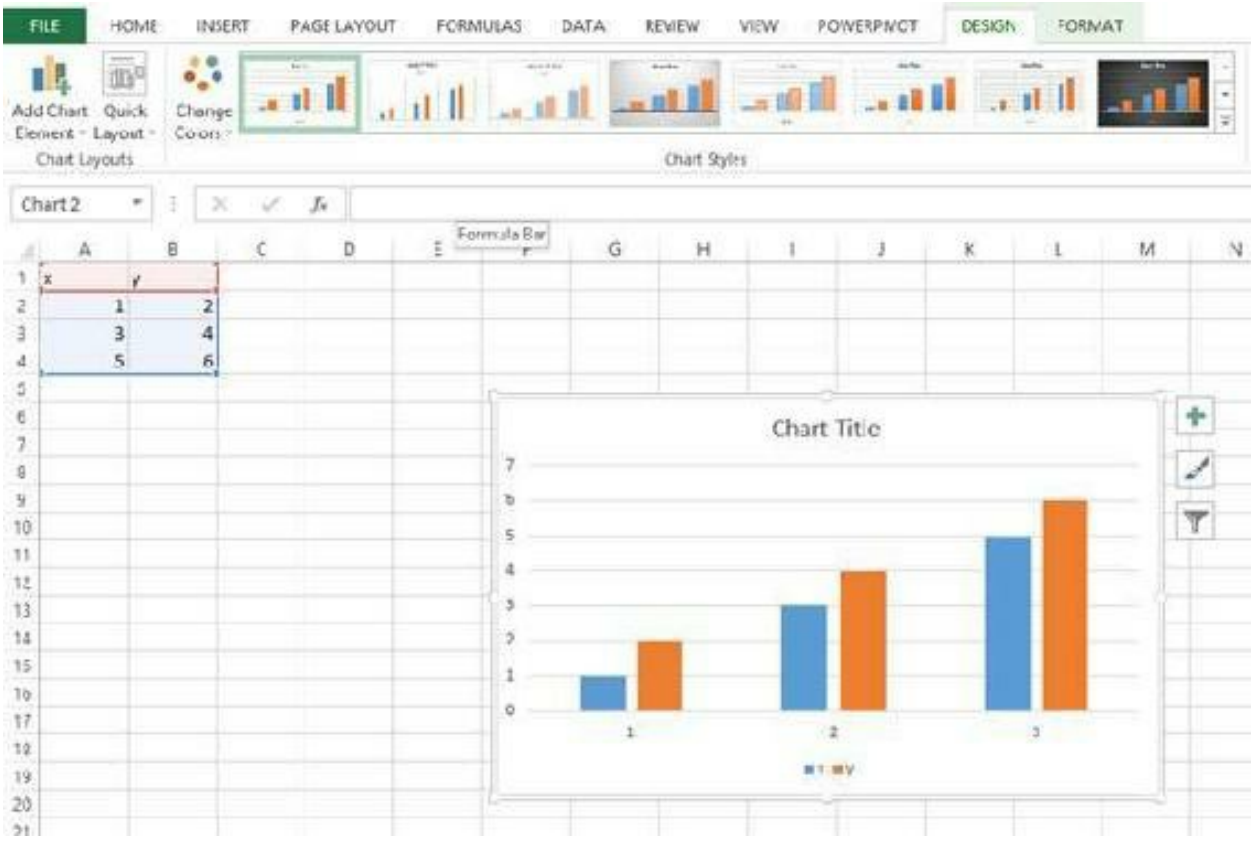
GOING THROUGH THE INSERT TAB TO CREATE A CHART

This way becomes very useful if the chart you want to create doesn't appear in the **Recommended Charts** gallery.

To Create a Chart through the Insert Tab:

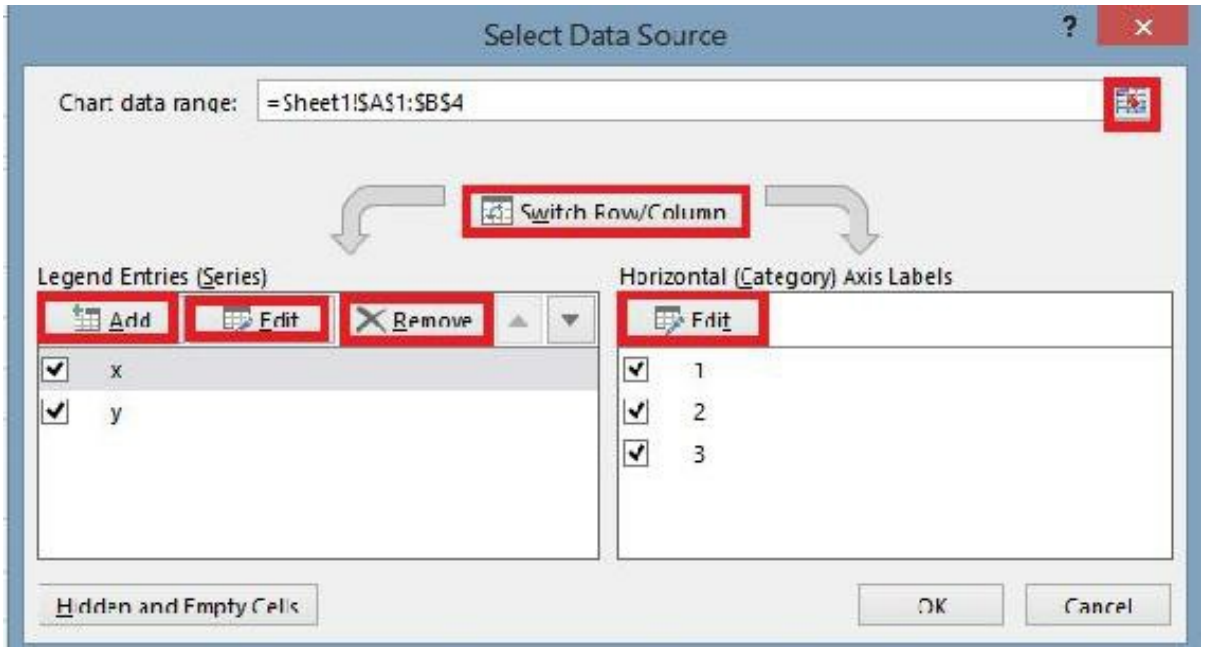
1. Select the data that you want to summarize visually.
2. Then, on the Insert tab, in the Charts group, click the type of chart that you want to create to have. Excel display the available chart subtypes. When you point to a subtype, Excel displays a live preview of what the chart will look like if you click that subtype.

When you click a chart subtype, Excel creates the chart by using the default layout and color scheme defined in your workbook's theme.



NOTES:

- To create a chart of the default type on the current worksheet, press **Alt+F11**.
- To create a new chart sheet, press **F11**.
- The default Excel creates is a **Column chart**.
- If Excel doesn't plot your data the way that you want it to appear, you can change the axis on which Excel plots a data column.
- To change which data Excel applies to the vertical axis and the horizontal axis, select the chart and then > on the **Design** tab, in the **Data** group, click **Select Data** to open the Select Data Source dialog box.



To Remove a Column from an Axis:

1. Select the column's name, and then click Remove. To add the column to the Horizontal (Category) Axis Labels pane, click that pane's Edit button to display the Axis Labels dialog box, which you can use to select a range of cells on a worksheet to provide values for an axis.
2. In the Axis Labels dialog box, click the Collapse Dialog button at the right edge of the Axis
3. Label Range field, select the cells to provide the values for the horizontal axis (not including the column header, if any), click the Expand Dialog button, and then click **OK**. Click **OK** again to close the **Select Data Source** dialog box and revisit your chart.

TYPES OF CHARTS AND SHORTCUT KEYS TO CREATE THEM

COLUMN CHART

- **2-D COLUMN CHART:**
  It illustrates comparisons between Items. It also shows variation over a period of time.
- **STACKED COLUMN CHART:**
  It shows relationship of parts to a whole

There are other types like: clustered column, 100% stacked column, 3-D

clustered column, 3-D stacked, 3-D 100% stacked column, 3D column charts.

SHORTCUT KEYS:
Hit the **Alt** key. Then type **NCM** (one key at a time).

LINE CHART

- **2-D LINE CHART:**
  It emphasizes time flow and rate of change rather than the amount of change. It also shows trends or changes in data over a period of time at even intervals.
- **HIGH-LOW-CLOSE:**
  It is used to illustrate rate of changes in stock prices.

There are other types like: line, stacked line, 100%stacked line, line with markers, stacked line with markers, 100 % stacked line with markers, 3-D line charts.

SHORTCUT KEYS:
Hit the **Alt** key. Then type **NNM** (one key at a time).

PIE CHART

- **2D PIE CHART:**
  It uses only one data series. It also shows relationship of parts to a whole.

There are other types like: 3-D pie, pie of pie, bar of pie and doughnut (It is similar to pie chart but with more than one data series) charts.

SHORTCUT KEYS:
Hit the Alt key. Then type NQM (one key at a time).

BAR CHART

- **BASIC BAR CHART:**
  It illustrates comparisons between items. It also shows individual figures at a specific time.
- **STACKED BAR CHART:**
  It shows the relationship of parts to a whole.

SHORTCUT KEYS:
Hit the **Alt** key. Then type **NBM** (one key at a time).

AREA CHART

- **2D AREA CHART**

  It emphasizes amount of change i.e. the magnitude of values. It also shows relative importance of values over a period of time.

SHORTCUT KEYS

Hit the **Alt** key. Then type **NAM** (one key at a time).

XY (SCATTER) CHART

It is normally used for scientific data analysis. It shows the relationship for degree of relationship between the numeric values in several chart data series. It plots two groups of numbers as one series of a series of XY- coordinates.

SHORTCUT KEYS:

Hit the **Alt** key. Then type **NDM** (one key at a time).

RADAR CHART

It shows changes or frequencies of data series relative to a central point and to one another. There are many types like: radar with markers and filled radar.

SHORTCUT KEYS:

Hit the **Alt** key. Then type **NOM** (one key at a time).

STOCK CHART

To create stock chart, arrange the data on tour sheet in this order: high price, low price, closing price. Use dates or stock names as labels. There are many types like: high-low-close, open-high-low-close, volume-high-low-close and volume-open-high-low-close.

SHORTCUT KEYS:

Hit the **Alt** key. Then type **NOM** (one key at a time).

3-D SURFACE CHART

It is used in topographic maps. There are many types like: wireframe 3-D, contour and wireframe contour.

SHORTCUT KEYS:

Hit the **Alt** key. Then type **NOM** (one key at a time).

COMBO CHARTS

There are many types like: clustered column – line, clustered column – line on secondary axis, stacked area – secondary column and clustered combination.

SHORTCUT KEYS:

Hit the **Alt** key. Then type **NSDC** (one key at a time).

HOW TO MOVE A CHART WITHIN A WORKSHEET OR TO A NEW WORKSHEET

To move a chart within a worksheet, drag the chart to the desired location.

If you want to move the chart to a new worksheet, click the chart and then, on the **Design tool** tab, in the Location group, click **Move Chart** to open the **Move Chart** dialogue box.

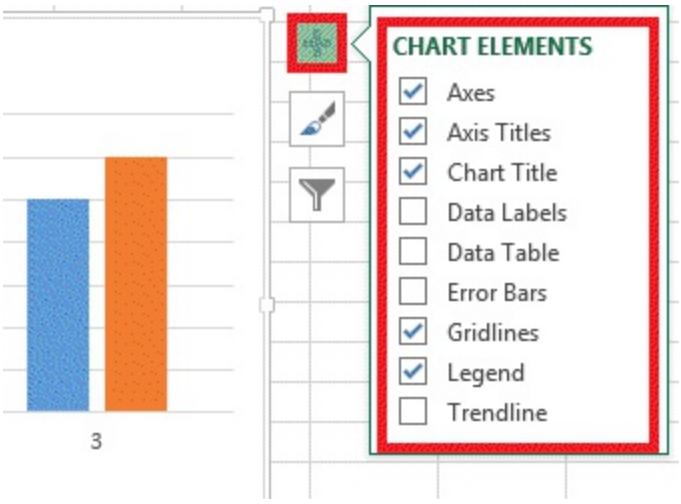
To move the chart to an existing worksheet, click **Object In** and then, in the **Object In** list, click the worksheet to which you want to move the chart.

HOW TO CUSTOMIZE THE APPEARANCE OF YOUR CHARTS

After you have created your chart, you may want to customize and beautify it so that it becomes attractive and unique. Excel has some galleries that can help you achieve that easily.
There are three main tools that you can use to customize your charts. They include:

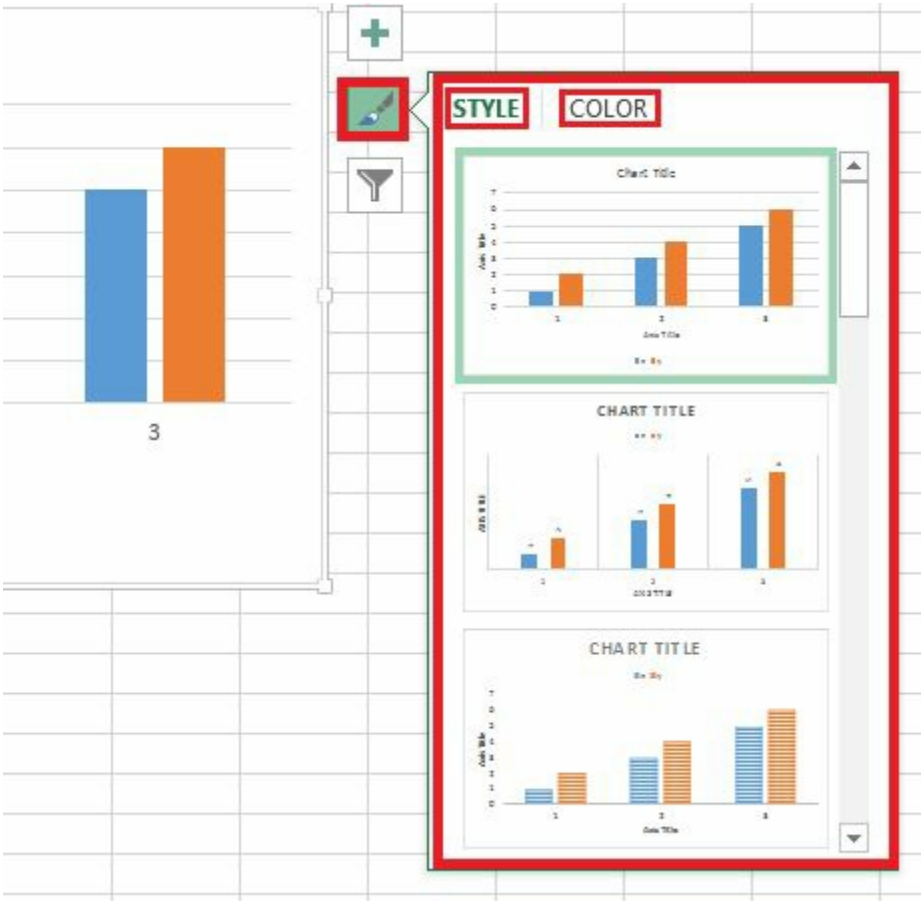
- **Chart Elements gallery**

Allows you to add, remove or change chart elements such as title, label, gridlines, data labels, etc. It becomes very useful especially if you don't find the exact chart layout you want, you can select the chart and then click the Chart Elements action button, which appears to the right of the chart, to control each element's appearance and options.

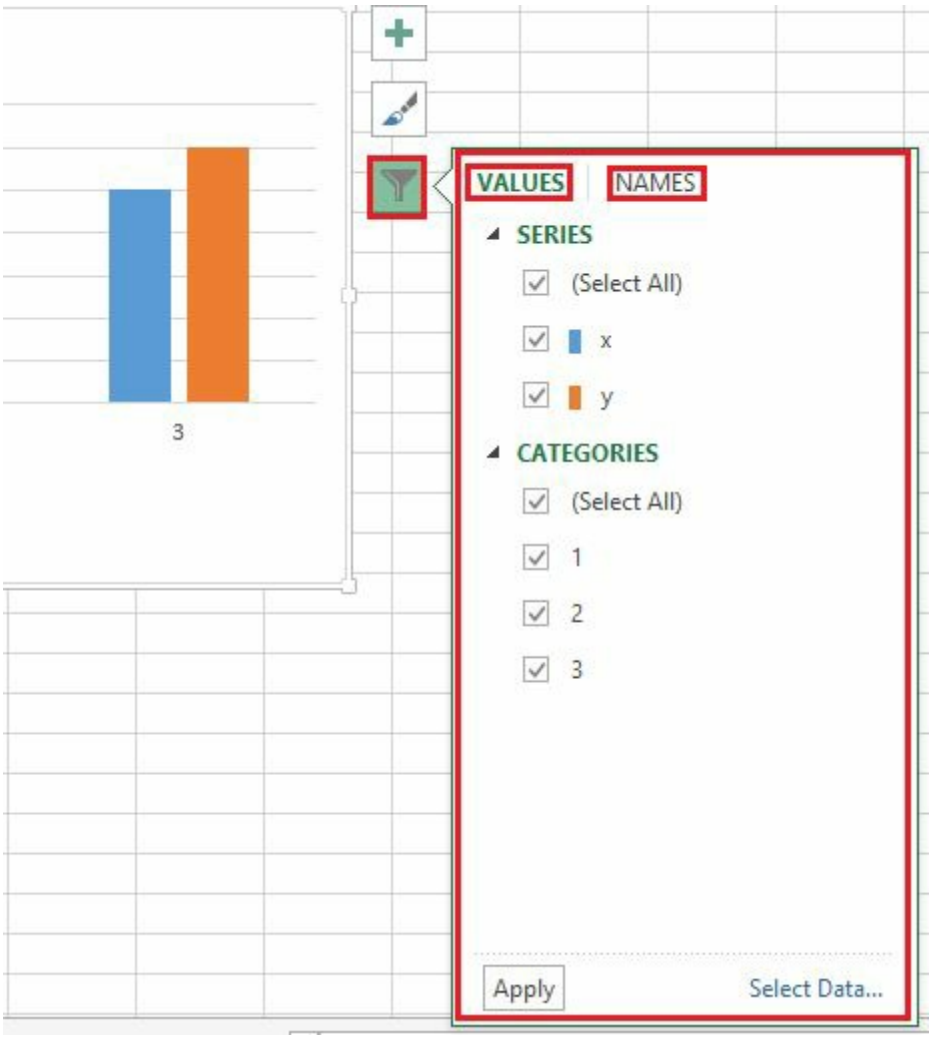


- **Chart Styles gallery**

Allows you to set style and colour scheme for your charts. It has two tabs: the **Style** and the **Colour** tab. You can select a new look for your chart by choosing from the many styles on the Style. Clicking the **Colour** tab in the **Chart Styles** gallery displays a series of color schemes that you can select to change your chart's appearance.



- **Chart Filters gallery**
  Allows you to edit data points and name that are visible on your chart. It also has two tabs: the **values** and the **names** tab.



PREDICTNG YOUR CHART DATA TRENDS IN MS-EXCEL

Excel can help you predict your business trend make its best guess on how your business has performed in the past.

To Utilize Excel Capability to Predict Future Values in your Data Series:

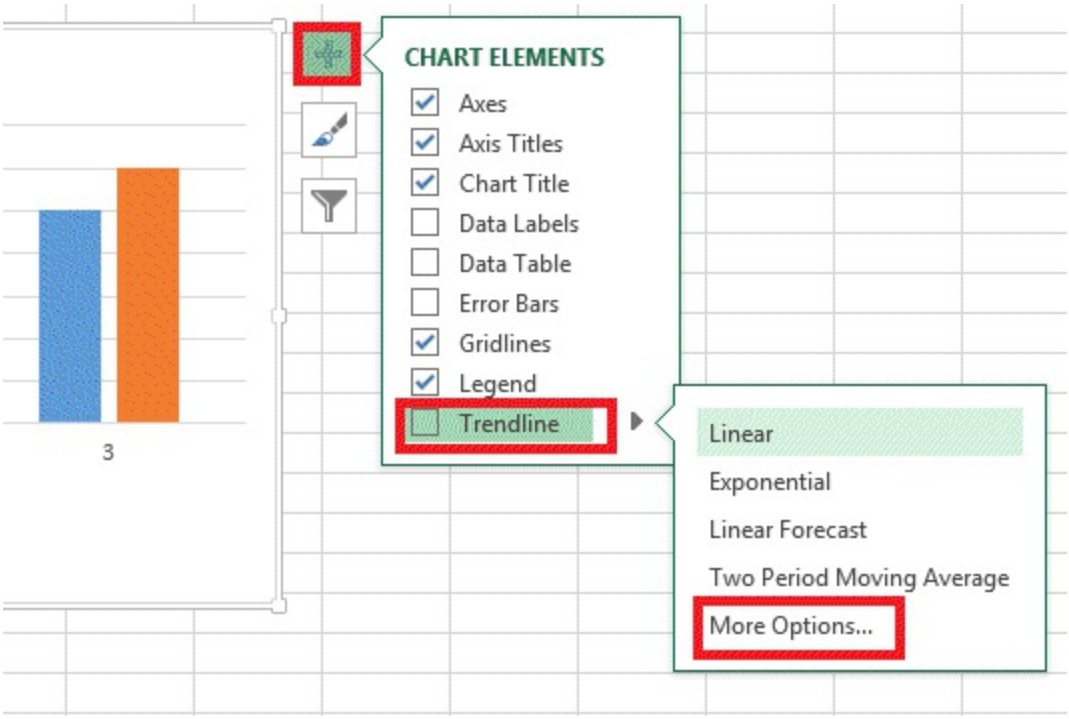
1. Click the chart (create one if you have not done so) and then click the Chart Elements action button
2. Point to **Trendline** and then click the right-pointing triangle that appears, and then click More Options to display the **Format Trendline** pane. Excel asks you to add a Trendline based on series. Select the column you

wish to find the trend and click **OK**.

3. On the **Trendline** Options page of the **Format Trendline** pane, you can choose the data distribution that Excel should expect when it makes its projection.
4. After you choose the distribution type, you can tell Excel how far ahead to project the data trend.

NOTE:

It is advisable that you choose **Linear** because it applies to most business data. The other distributions are used for scientific and engineering applications and you will most likely know, or be told by a colleague, when to use them.



HOW TO SUMMARIZE YOUR DATA BY USING SPARKLINES

You can create charts in Excel workbooks to summarize your data visually by using legends, labels, and colors to highlight aspects of your data. It is possible to create very small charts to summarize your data in an overview worksheet, but you can also use Sparkline to create compact, informative charts that provide valuable context for your data.

In Excel, a Sparkline occupies a single cell, which makes it ideal for use in

summary worksheets. As an example, suppose you wanted to summarize the monthly revenue data for one of Consolidated Messenger's local branches. A sample data is shown below.

	A	B	C	D	E	F
1						
2		**Month**	**Revenue**	**Target**	**Difference**	
3		January	$1,538,468	$1,600,000	$ (61,532)	
4		February	$1,474,289	$1,600,000	$ (125,711)	
5		March	$1,416,242	$1,600,000	$ (183,758)	
6		April	$1,685,377	$1,600,000	$ 85,377	
7		May	$1,573,046	$1,600,000	$ (26,954)	
8		June	$1,979,077	$1,600,000	$ 379,077	
9		July	$1,600,000	$1,600,000	$ -	
10		August	$2,417,226	$1,600,000	$ 817,226	
11		September	$1,872,026	$1,600,000	$ 272,026	
12		October	$2,097,478	$1,600,000	$ 497,478	
13		November	$2,876,025	$2,750,000	$ 126,025	
14		December	$3,825,430	$4,000,000	$ (174,570)	
15						

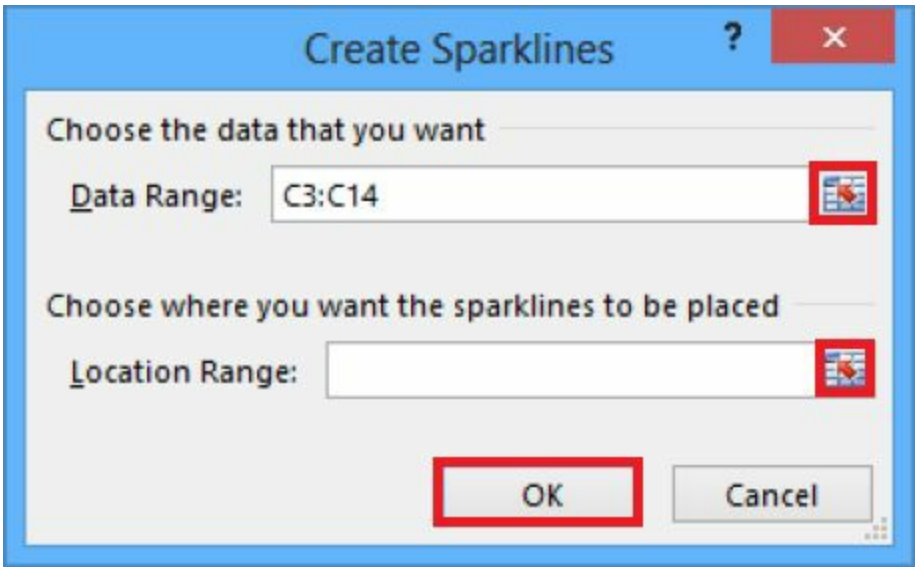
In Excel there are three types of Sparkline:

- Line Sparkline
- Column Sparkline
- Win/Loss Sparkline

The line and column Sparkline are compact versions of the standard line and column charts. The win/loss Sparkline indicates whether a cell value is positive (a win), negative (a loss), or zero (a tie).

To Create a Line Sparkline:

1. Select the data you want to summarize and then, on the **Insert** tab, in the **Sparklines** group, click the **Line** button.
2. Excel displays the **Create Sparklines** dialogue box as shown below.



3. The data range you selected appears in the **Data Range** box. If the data range is not correct, you can click the **Collapse** Dialogue button to the right of the Data Range box, select the correct cells, and then click the **Expand** Dialogue button.
4. Then, in the **Location Range** box, enter the address of the cell into which you want to place your Sparkline. When you click **OK**,

Excel creates a line Sparkline in the cell you specified as shown below.

B	C	D	E	F	G	H
Month	Revenue	Target	Difference		Trend	By Month
January	$1,538,468	$1,600,000	$ (61,532)			
February	$1,474,289	$1,600,000	$ (125,711)			
March	$1,416,242	$1,600,000	$ (183,758)			
April	$1,685,377	$1,600,000	$ 85,377			
May	$1,573,046	$1,600,000	$ (26,954)			
June	$1,979,077	$1,600,000	$ 379,077			
July	$1,600,000	$1,600,000	$ -			
August	$2,417,226	$1,600,000	$ 817,226			
September	$1,872,026	$1,600,000	$ 272,026			
October	$2,097,478	$1,600,000	$ 497,478			
November	$2,876,025	$2,750,000	$ 126,025			
December	$3,825,430	$4,000,000	$ (174,570)			

You follow the same basic procedure to create a column Sparkline, except that instead of clicking the Line button in the **Sparklines** group on the Insert tab,

you click the **Column** button.

To create a win/loss Sparkline:

1. Ensure that your data contains, or could contain, both positive and negative values. If you measured monthly revenue for Consolidated Messenger, every value would be positive and the win/loss Sparkline would impart no meaningful information. Comparing revenue to revenue targets, however, could result in positive, negative, or tie values, which can be meaningfully summarized by using a win/loss Sparkline.
2. Follow the same data selection process and click the Win/Loss button as shown below.

Months in which Consolidated Messenger's branch exceeded its revenue target appear in the top half of the cell in blue, months in which the branch fell short of its target appear in the bottom half of the cell in red, and the month in which the revenue was exactly the same as the target is blank.

3. After you create a Sparkline, you can change its appearance. Because a Sparkline takes up the entire interior of a single cell, resizing that cell's row or column resizes the Sparkline. You can also change a Sparkline's formatting. When you click a Sparkline, Excel displays the Design tool tab as shown below.

NOTES:

- You can use the tools on the Design tool tab to select a new style; show or hide value markers; change the color of your Sparkline or the markers; edit the data used to create the Sparkline; modify the labels on the

Sparkline's axes; or group, ungroup, or clear Sparkline.

- You can't delete a Sparkline by clicking its cell and then pressing the Delete or Backspace key—you must click the cell and then, on the Design tool tab, click the Clear button.

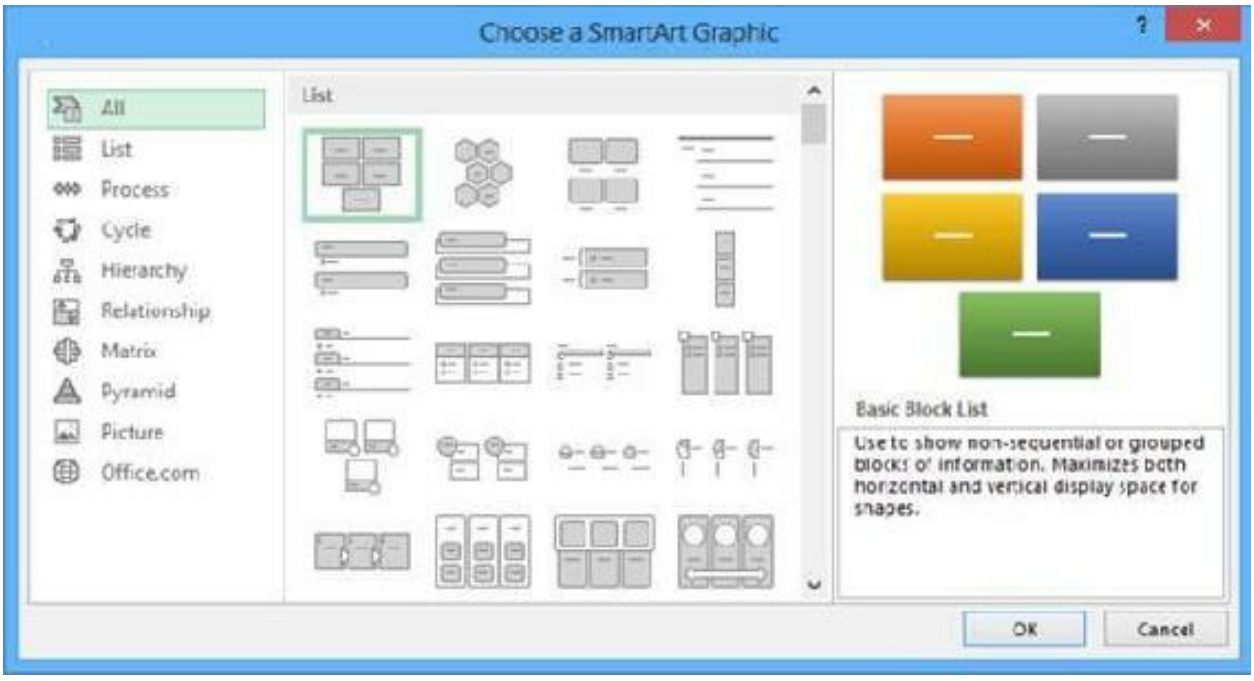
MANIPULATIONS ON SMARTART, DUAL-AXIS CHARTS, SHAPES AND MATHEMATICAL EQUATIONS IN MS-EXCEL

HOW TO USE SMARTART TO CREATE DIAGRAMS IN EXCEL

Many times, as a Chief Operating Officer of a company, you will need to summarize the company's processes for the Board of Directors by creating diagrams. Excel has just the tool you needs to create those diagrams: SmartArt.

To Create a SmartArt graphic:

1. Click **SmartArt** on the **Insert** tab, in the Illustrations group to display the **Choose A SmartArt Graphic** dialogue box as shown below.



2. When you click one of the thumbnails in the center pane of the **Choose A SmartArt Graphic** dialogue box, Excel displays a description of the diagram type you selected in the rightmost pane of the dialog box. Clicking **All** displays every available SmartArt graphic type.

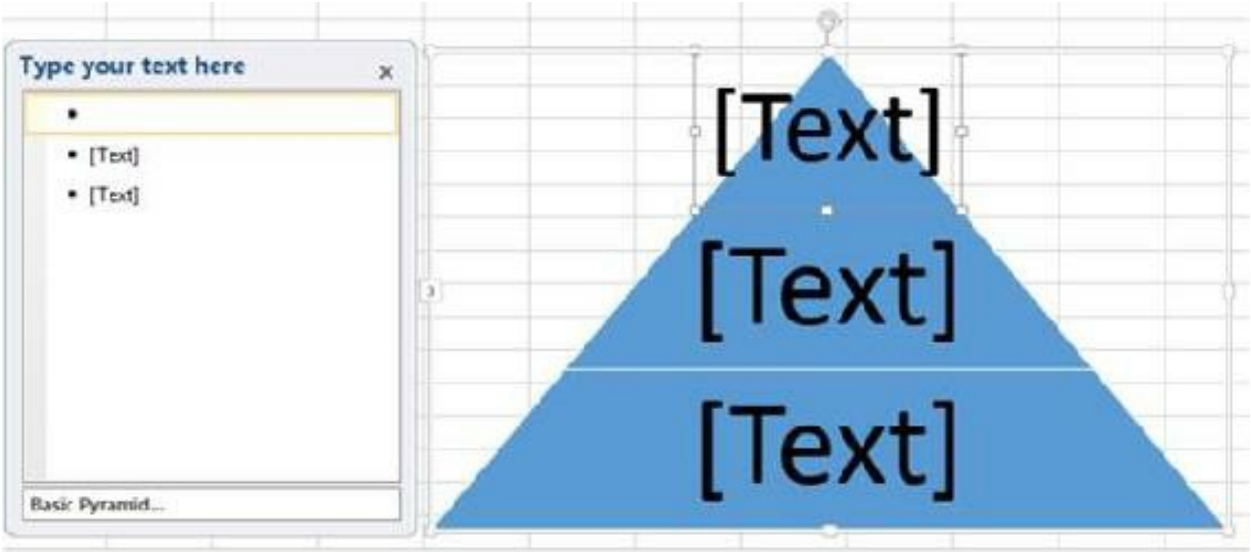
The table in the figure below lists the types of diagrams you can create by using the **Choose A SmartArt Graphic** dialogue box.

Diagram	Description
List	Shows a series of items that typically require a large amount of text to explain
Process	Shows a progression of sequential steps through a task, process, or workflow
Cycle	Shows a process with a continuous cycle or relationships of core elements
Hierarchy	Shows hierarchical relationships, such as those within a company
Relationship	Shows the relationships between two or more items
Matrix	Shows the relationship of components to a whole by using quadrants
Pyramid	Shows proportional, foundation-based, or hierarchical relationships such as a series of skills
Picture	Shows one or more images with captions

NOTE:

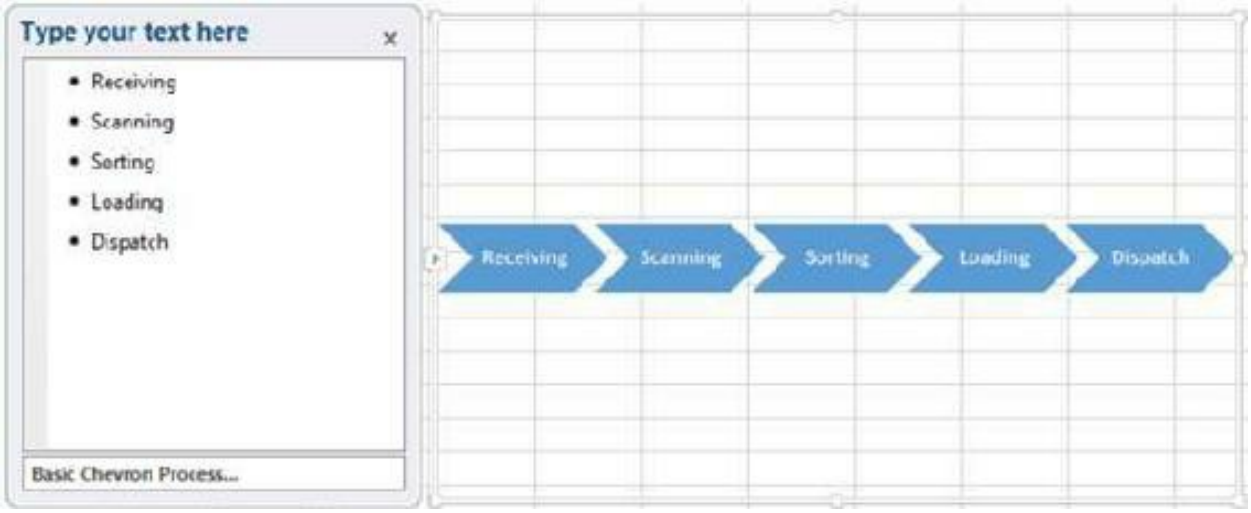
Some of the diagram types can be used to illustrate several types of relationships. Be sure to examine all your options before you decide on the type of diagram to use to illustrate your point.

3. After you click the button that represents the type of diagram you want to create, click **OK** to add the diagram to your worksheet.



4. While the diagram is selected, Excel displays the **Design** and **Format tool** tabs. You can use the tools on the **Design tool** tab to change the graphic's layout, style, or color scheme. The **Design tool** tab also contains the **Create Graphic** group, which is home to tools you can use to add a shape to the SmartArt graphic, add text to the graphic, and promote or demote shapes within the graphic.

As an example, consider a process diagram that describes how Consolidated Messenger handles a package within one of the company's regional distribution centers.



In the text pane, located to the left of the SmartArt graphic, you can add text to a shape without having to click and type within the shape. If you enter the process steps in the wrong order, you can move a shape by right-clicking the shape you want to move and then clicking Cut on the shortcut menu that appears.

5. To paste the shape back into the graphic, right-click the shape to the left of where you want the pasted shape to appear, and then click Paste. For example, if you have a five-step process and accidentally switch the second and third steps, you can move the third step to the second position by right-clicking the third step, clicking Cut, right-clicking the first shape, and then clicking Paste.
6. If you want to add a shape to a SmartArt graphic, to add a step to a process, for instance, click a shape next to the position you want the new shape to occupy and then, on the Design tool tab, in the Create Graphic group, click Add Shape, and then click the option that represents where you want the new shape to appear in relation to the selected shape.

NOTE:

The options that appear when you click Add Shape depend on the type of SmartArt graphic you created and which graphic element is selected. For instance, the options for an organizational chart are Add Shape After, Add

Shape Before, Add Shape Above, Add Shape Below, and Add Assistant.

7. You can edit the graphic's elements by using the buttons on the Format tool tab or by right-clicking the shape and then clicking Format Shape to display the Format Shape pane. If you have selected the text in a shape, you can use the tools in the Font group on the Home tab to change the text's appearance.

NOTE:
You can use the controls in the Format Shape dialog box to change the shape's fill colour, borders, shadow, three-dimensional appearance, and text box properties.

Shortcut Key of Creating Diagrams Using SmartArt

Hit the **Alt** key. Then type **NM** (one key at a time).

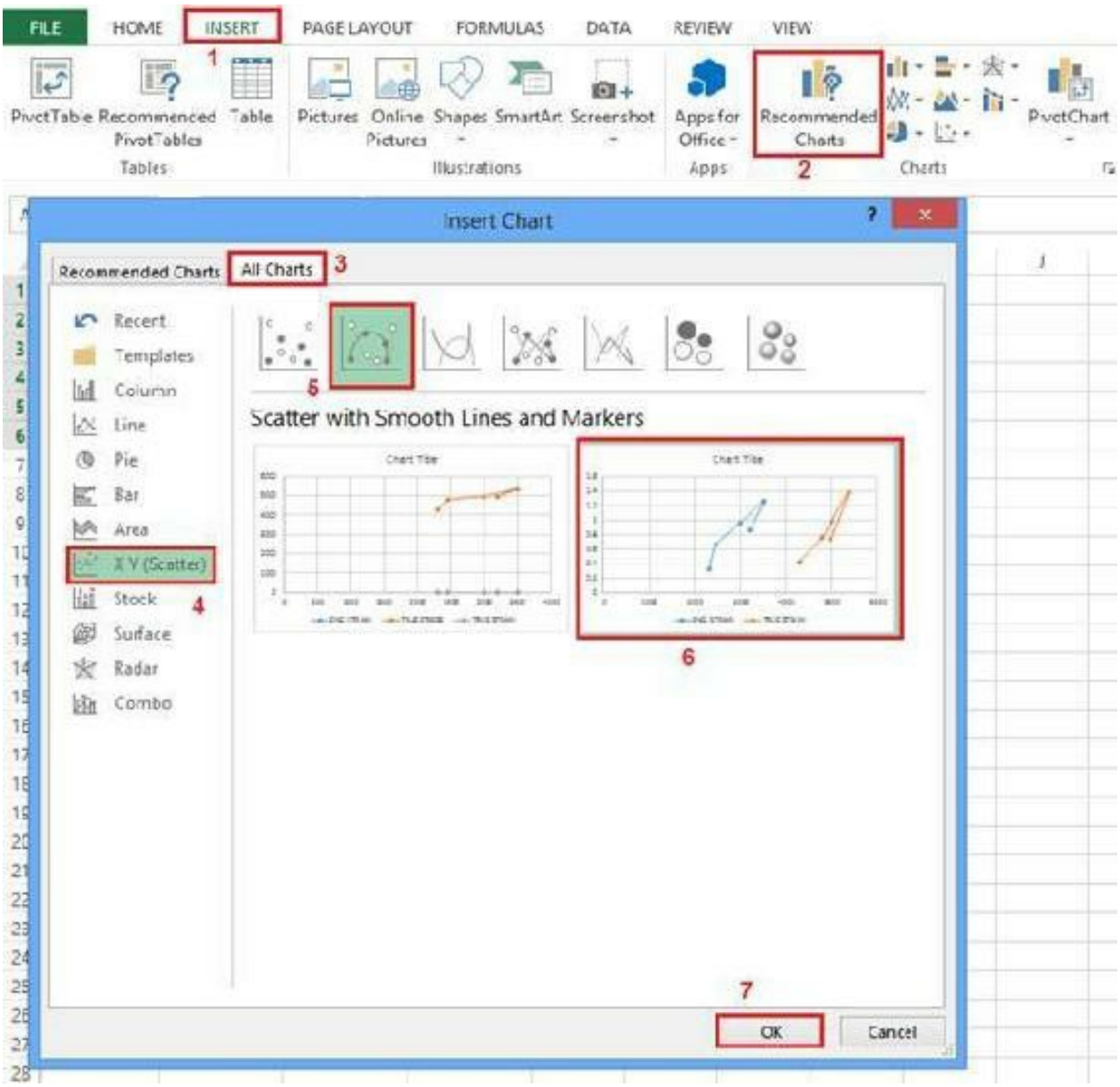
HOW TO CREATE DUAL-AXIS CHARTS IN MS-EXCEL

MS-Excel charting engine provides you with the flexibility to plot more than one data series, even if the series use two different scales. For example, you might to plot an XY scatter charts graph of Engineering Stress versus Engineering Strain and True Stress versus and True Strain in the same axes. The table is shown in the diagram below.

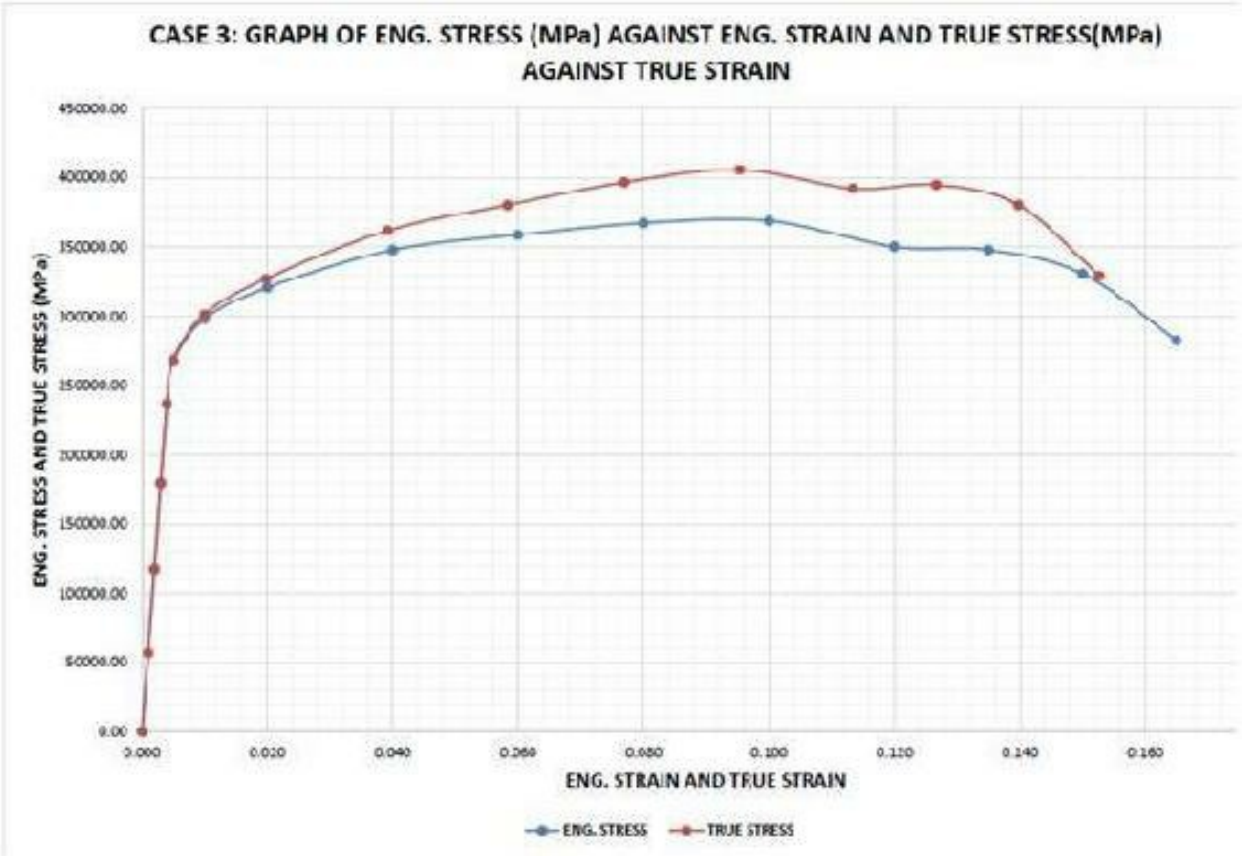
E	F	G	H
ENG. STRAIN	ENG. STRESS	TRUE STRAIN	TRUE STRESS
0.000	0.00	0.000	0.00
0.001	56955.79	0.001	57012.97
0.002	117330.47	0.002	117566.06
0.003	179492.31	0.003	180029.38
0.004	236214.99	0.004	237158.92
0.005	267295.91	0.005	268632.39
0.010	298376.83	0.010	301360.60
0.020	320910.50	0.020	327328.71
0.040	348106.30	0.039	362030.55
0.060	358984.62	0.058	380523.70
0.080	367531.88	0.077	396934.43
0.100	369085.92	0.095	405994.51
0.120	350437.37	0.113	392489.86
0.135	348106.30	0.127	395100.65
0.150	331011.80	0.140	380663.57
0.165	282836.37	0.153	329504.37

To Plot Two Graph Charts in the Same Axes in MS-Excel:

1. Ensure that you have prepared the data table. Highlight the entire table and click on **Insert** tab and click on **Recommended Charts** in the **Charts** group. The **Insert Charts** dialogue box displays.
2. Click the **All Charts** tab. Then from the charts category available, click on **XY (Scatter)**
3. From the sub category, select **Scatter with Smooth Lines and Markers**
4. Select the second option and click **OK** as shown below.



Excel inserts the chart as shown below.



HOW TO CREATE SHAPES AND MATHEMATICAL EQUATIONS IN MS-EXCEL

With Excel, you can also augment your worksheets by adding objects such as geometric shapes, lines, flowchart symbols, and banners.

To Add a Shape to your Worksheet:

1. Click the **Insert** tab and then, in the **Illustrations** group, click the **Shapes** button to display the shapes available.
2. When you click a shape in the gallery, the pointer changes from a white arrow to a thin black crosshair. To draw your shape, click anywhere in the worksheet and drag the pointer until your shape is the size you want.

3. When you release the mouse button, your shape appears and Excel

displays the Format tool tab as shown below.

NOTE:

Holding down the **Shift** key while you draw a shape keeps the shape's proportions constant. For example, clicking the **Rectangle** tool and then holding down the **Shift** key while you draw the shape causes you to draw a square.

4. You can resize a shape by clicking the shape and then dragging one of the resizing handles around the edge of the shape. You can drag a handle on a side of the shape to drag that side to a new position; when you drag a handle on the corner of the shape, you affect height and width simultaneously. If you hold down the Shift key while you drag a shape's corner, Excel keeps the shape's height and width in proportion.
5. To rotate a shape, select the shape and then drag the white rotation handle at the top of the selection outline in a circle until the shape is in the orientation you want.

NOTE:

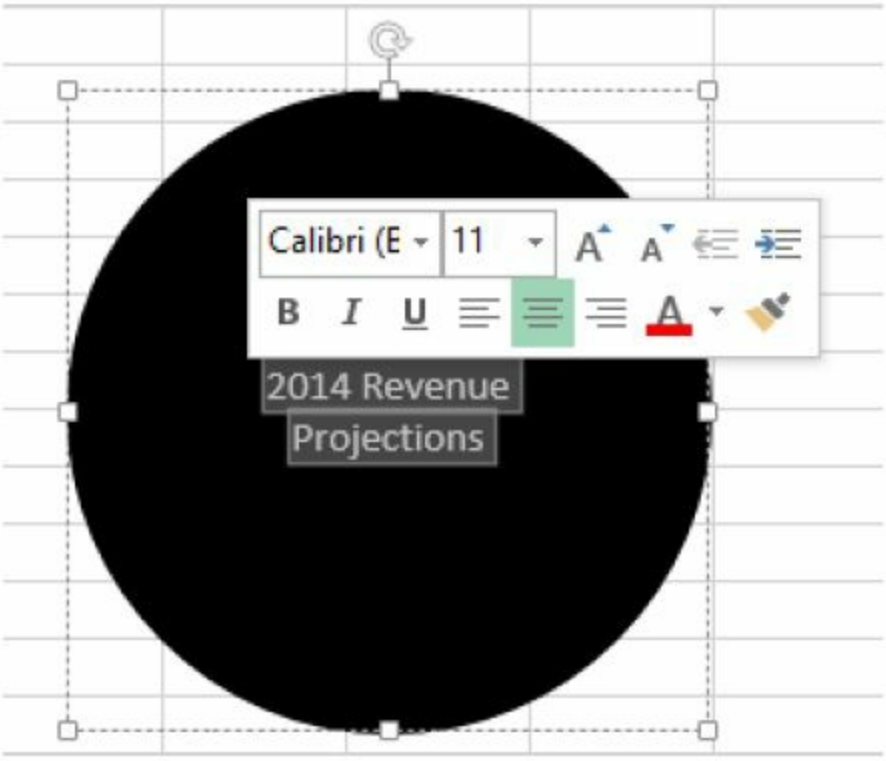
You can assign your shape a specific height and width by clicking the shape and then, on the Format tool tab, in the Size group, entering the values you want in the height and width boxes.

6. After you create a shape, you can use the controls on the Format tool tab to change its formatting.
7. To apply a predefined style, click the **More** button in the lower-right corner of the Shape Styles group's gallery and then click the style you want to apply.
8. If none of the predefined styles are exactly what you want, you can use the **Shape Fill**, **Shape Outline**, and **Shape Effects** options to change those aspects of the shape's appearance.

NOTE:

When you point to a formatting option, such as a style or option displayed in the Shape Fill, Shape Outline, or Shape Effects lists, Excel displays a live preview of how your shape would appear if you applied that formatting option. You can preview as many options as you like before committing to a change. If a live preview doesn't appear, click the File tab to display the **Backstage** view and then click Options to open the **Excel Options** dialog box. On the **General** page, check the **Enable Live Preview** check box and click **OK**.

9. If you want to use a shape as a label or header in a worksheet, you can add text to the shape's interior. To do so, select the shape and begin typing; when you're done adding text, click outside the shape to deselect it. You can edit a shape's text by moving the pointer over the text.
10. When the pointer is in position for you to edit the text, it will change from a white pointer with a four-pointed arrow to a black I-bar. You can then click the text to start editing it. If you want to change the text's appearance, you can use the commands on the Home tab or on the Mini Toolbar that appears when you select the text as shown below.



HOW TO ADD MATHEMATICAL EQUATIONS TO A SHAPE IN EXCEL

One other way to work with shapes in Excel is to add mathematical equations to their interior. As an example, a business analyst might evaluate Consolidated Messenger's financial performance by using a ratio that can be expressed with an equation.

To add an equation to a shape:

1. Click the shape and then, on the Insert tab, in the Symbols group, click **Equation**, and then click the **Design tool** tab to display the interface for

editing equations as shown below.

Clicking the Equation arrow displays a list of common equations, such as the Pythagorean Theorem, that you can add with a single click.

2. Click any of the controls in the Structures group to begin creating an equation of that type. You can fill in the details of a structure by adding text normally or by adding symbols from the gallery in the Symbols group.

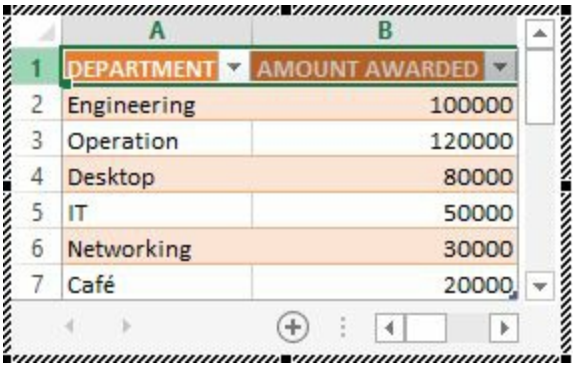
In Summary:

- You can use charts to summarize large sets of data in an easy-to-follow visual format.
- You're not stuck with the chart you create; if you want to change it, you can.
- If you format many of your charts the same way, creating a chart template can save you a lot of work in the future.
- Adding chart labels and a legend makes your chart much easier to follow.
- When you format your data properly, you can create dual-axis charts, which are compact and easy to read.
- If your chart data represents a series of events over time (such as monthly or yearly sales), you can use Trendline analysis to extrapolate future events based on the past data.
- With Sparkline, you can summarize your data in a compact space, providing valuable context for values in your worksheets.
- With Excel, you can quickly create and modify common business and organizational diagrams, such as organization charts and process diagrams.
- You can create and modify shapes to enhance your workbook's visual impact.
- The improved equation editing capabilities help Excel 2013 users communicate their thinking to their colleagues.

PRACTICAL EXERCISE FOR CHAPTER 2

Attempt these sample questions:

1. Explain briefly the following with good examples:
   a. Characters.
   b. Field.
   c. Field name.
   d. Database.
   e. Sorting field.
   f. Data range.
2. How can the following be achieved:
   a. Sorting a database.
   b. Filtering a database using Advance Filter Method.
3. List and explain the real life or practical applications of any five type of charts you know.
4. **Joe-Links Computer Institute** awards the following amount to each department as shown in the table below.



	A	B
1	DEPARTMENT	AMOUNT AWARDED
2	Engineering	100000
3	Operation	120000
4	Desktop	80000
5	IT	50000
6	Networking	30000
7	Café	20000

Design a pie chart using the data given in the table above.

CHAPTER 3: PRACTICAL AND BUSINESS APPLICATIONS OF BUILT-IN FUNCTIONS IN MS-EXCEL

One of the attributes of Microsoft Excel that make it unique is its built-in functions that have real life applications both in various fields of study and in business. Some of these built-in functions are:

- **IF functions**
- **ARITHMETIC functions such as the SUM function, AVERAGE function, etc.**
- **FORECAST function**
- **TREND function**
- **COUNTIF function**
- **SUMIF function**
- **CONCATENATE functions**

In this chapter, we will explicitly explain these functions with illustrations and real life applications.

IF FUNCTION ANALYSIS

IF function is a logical function or conditional statement used to evaluate a given condition. It returns the first variable if the condition is true or met, otherwise it returns the second variable. If the condition is false or not met.

Various application software have IF function as one of their built-in functions with slight difference with

The syntax is **=IF(condition,[value_if_true],[value_if_false])** Enter

Where;

Condition is the criteria set for excel to use for the evaluation of the records.

value_if_true is the variable that will be returned if the condition is met.

value_if_false is the variable that will be returned if the condition is not met. It is most times ignored.

NESTED IF FUNCTION

Nested IF function is a special case of IF function whereby an IF function is enclosed in another IF function. It is used when there are more than one conditions to specify. For example, the worksheet in the figure below contains a table for sales record. In the table, there is a **Remark** column to contain a remark for each sale.

	A	B	C	D	E
1	ITEM	QTY	COST	SALES	REMARK
2	Radio	3	600	800	profit
3	TV	4	700	1000	profit
4	Watch	2	10000	9500	loss
5	Bag	3	6000	6000	break even

If you want Excel to tell you whether you made a profit, loss or you just broke even (I.e. no profit no loss) whenever you enter the item, the quantity sold, the cost price and the selling price, then you will apply a nested IF function in that column.

Place your cursor in cell D2 and type the following nested IF function:

=IF(D2>C2,"profit",IF(D2<C2,"loss",IF(D2=C2,"break even"))) press Enter.

Then use excel fill handle tool to generate a remark for the subsequent cells in the **Remark** column.

PRACTICAL ILLUSTRATION/BUSINESS APPLICATIONS OF NESTED IF FUNCTION

I will illustrate the various real-life applications of Arithmetic and Nested IF functions of MS-Excel. Please try to practice these examples on your own.

STUDENTS RESULT SYSTEM (GRADE LIST)

QUESTION:

Given that the grade system of Government Secondary School Owerri is as follows:

0 to 39.9 = F

40 to 49.9 = E

50 to 59.9 = D

60 to 69.9 = C

70 to 79.9 = B

80 to 100 = A

Above 100 = Error

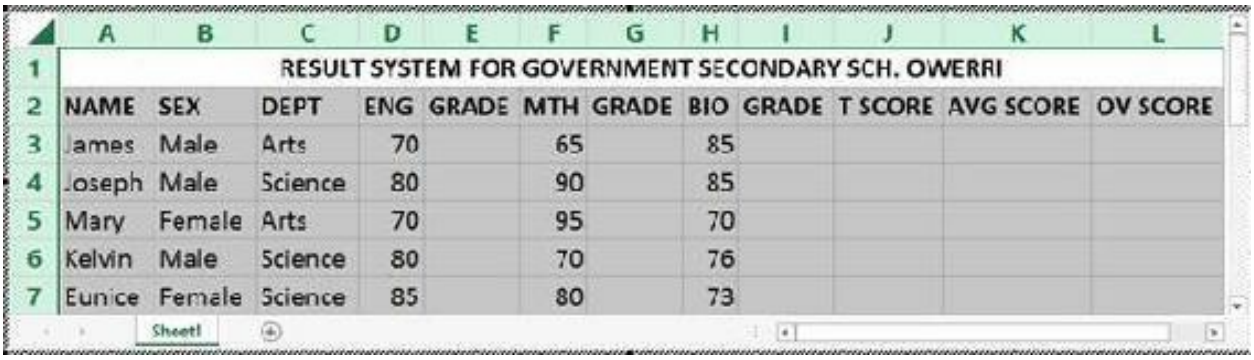
If 50 students participated in the examination of the following courses:

Mathematics, English and Biology, using the above grade system, calculate the following for each student:

1. Total score.
2. Average Score.
3. Grades on the respective subjects.
4. Overall grade.
5. Filter all female students that made an “A” in mathematics.

SOLUTION TO THE GRADE LIST SYSTEM QUESTION

You should first create a table like the one contained in the worksheet in the figure below.



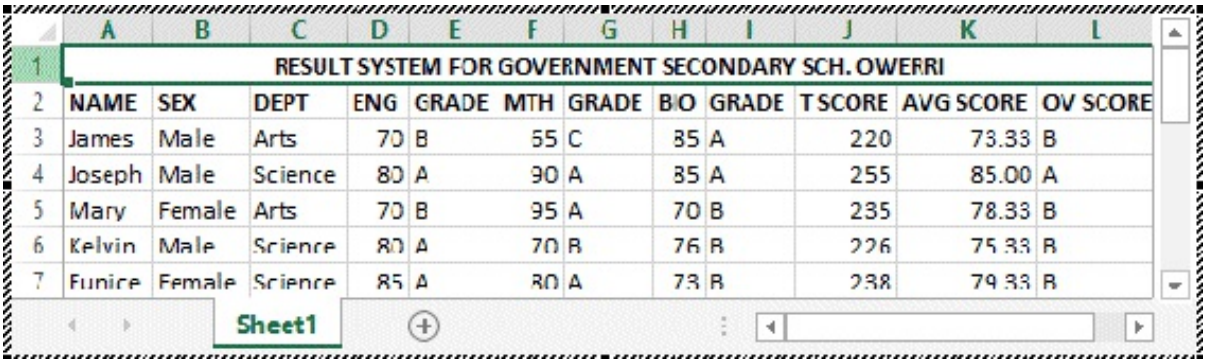
	A	B	C	D	E	F	G	H	I	J	K	L
1	RESULT SYSTEM FOR GOVERNMENT SECONDARY SCH. OWERRI											
2	NAME	SEX	DEPT	ENG	GRADE	MTH	GRADE	BIO	GRADE	T SCORE	AVG SCORE	OV SCORE
3	James	Male	Arts	70		65		85				
4	Joseph	Male	Science	80		90		85				
5	Mary	Female	Arts	70		95		70				
6	Kelvin	Male	Science	80		70		76				
7	Eunice	Female	Science	85		80		73				

Sheet1

Type in the following formulas in the appropriate cells and use the hand fill tool to generate the results for the subsequent cells in that column:

1. For the TOTAL SCORE column, place your cursor in cell J3 and type the following formula:
   =SUM(D3,F3,H3) press Enter key.
2. For the AVERAGE SCORE column, place your cursor in cell I3 and type the following formula:
   =J3/3 press Enter key. Reduce the number of decimals to two.
3. For the ENGLISH GRADE column, place your cursor in cell E3 and type the following formula:
   =IF(D3<40,"F",IF(D3<50,"E",IF(D3<60,"D",IF(D3<70,"C",IF(D3<8
   press Enter key.
4. For the MATHEMATICS GRADE column, place your cursor in cell G3 and type the following formula:
   =IF(F3<40,"F",IF(F3<50,"E",IF(F3<60,"D",IF(F3<70,"C",IF(F3<80
   press Enter key.
5. For the BIOLOGY GRADE column, place your cursor in cell I3 and type the following formula:
   =IF(H3<40,"F",IF(H3<50,"E",IF(H3<60,"D",IF(H3<70,"C",IF(H3<
   press Enter key.
6. For the OVERALL GRADE column, place your cursor in cell G3 and type the following formula:
   =IF(F3<40,"F",IF(F3<50,"E",IF(F3<60,"D",IF(F3<70,"C",IF(F3<80
   press Enter key.

The completed Grade List System is shown below.



	A	B	C	D	E	F	G	H	I	J	K	L
1	RESULT SYSTEM FOR GOVERNMENT SECONDARY SCH. OWERRI											
2	NAME	SEX	DEPT	ENG	GRADE	MTH	GRADE	B/O	GRADE	T SCORE	AVG SCORE	OV SCORE
3	James	Male	Arts	70	B	55	C	85	A	220	73.33	B
4	Joseph	Male	Science	80	A	90	A	85	A	255	85.00	A
5	Mary	Female	Arts	70	B	95	A	70	B	235	78.33	B
6	Kelvin	Male	Science	80	A	70	B	76	B	226	75.33	B
7	Eunice	Female	Science	85	A	80	A	73	B	238	79.33	B

Sheet1

7. Create the three ranges of data. Type “Female” in the **Sex** column under the criteria range. Type “A” in the **Mathematics Grade** column under the criteria range.
   Use the procedure for performing Advance filter to filter the database based on the specified criteria.
   You might need to revisit chapter 2 for the procedure for advance filter.

PAYROLL SYSTEM

This is the compilation or list of workers' information and their payment details in an organization or company. It is a database containing all workers information and their payment details such as basic salary, allowances, gross pay, and net pay.

DEFINITION OF SOME TERMS USED IN PAYROLL MANAGEMENT

1. **PAY SLIP:**
   This is a detached leaflet or a record from the payroll that contains a worker's information and payment details.
2. **BASIC SALARY:**
   This is an amount or sum of money a worker is entitled to at the end of the month in a company or organization which is highly influenced by worker's qualifications and level, and also by the strength of the organization.
3. **ALLOWANCE:**
   This is a fringe benefit that is allocated to every worker in order to encourage workers and enhance their performance in the company or organization.
4. **TAX:**
   This is a compulsory levy that is deducted from a worker's basic salary at the end of the month in order to generate revenue for the state and federal government.
5. **GROSS PAY:**
   This is the summation of or the total of a worker's basic salary and all the allowances he is entitled to at the end of every month.
6. **NET PAY:**
   This is Gross pay minus all deductions such as tax and loans. It is the final take-home of a worker at the end of the month.

PRACTICAL ILLUSTRATION OF A PAYROLL SYSTEM

QUESTION:

The manager of JOE-LINKS SERVICES wants to computerize the payroll system of the company. As a spreadsheet expert, design a payroll system to his recommendation and approval to pay his workers on monthly basis such that basic salary is influenced by qualification as follows:

- WASSCE = $20,000
- OND = $25,000
- NCE = $28,000
- HND = $32,000
- BSc = $40,000
- MSc = $50,000
- PhD = $80,000 respectively.

Marital allowance would be 8% and 10% for single and married workers respectively. Transport, Feeding, Dressing and Housing allowances would be 6%, 4%, 5%, and 8% of their basic salaries respectively.

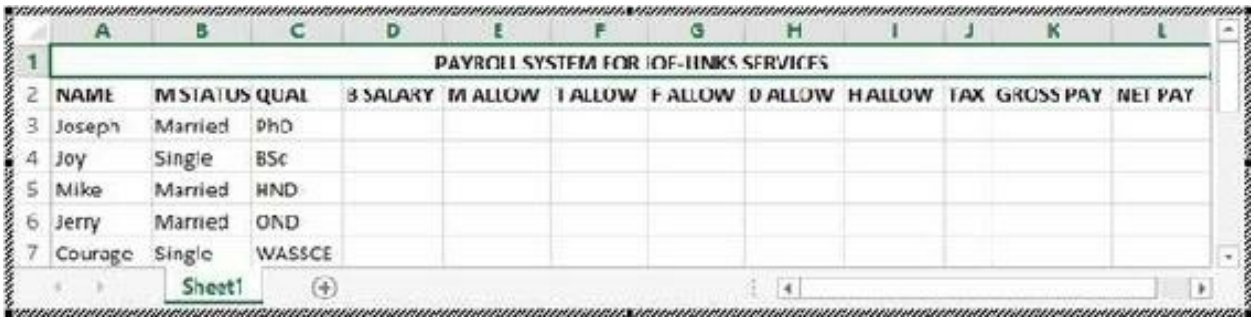
Compute a tax deduction such that:
WASSCE = 5%, OND = 6%, NCE = 8%, HND = 10%, BSc = 12%, MSc = 15% and PhD = 20% of their basic salaries respectively.

Calculate the Gross pay and Net pay for each worker.

Setup an advanced query or filter to filter all the married workers with qualification of BSc.

SOLUTION TO THE PAYROLL SYSTEM PROBLEM

You should first create a table like the one contained in the spreadsheet in the figure below:



	A	B	C	D	E	F	G	H	I	J	K	L
1	PAYROLL SYSTEM FOR JOE-LINKS SERVICES											
2	NAME	M STATUS	QUAL	B SALARY	M ALLOW	T ALLOW	F ALLOW	D ALLOW	H ALLOW	TAX	GROSS PAY	NET PAY
3	Joseph	Married	PhD									
4	Joy	Single	BSc									
5	Mike	Married	HND									
6	Jerry	Married	OND									
7	Courage	Single	WASSCE									

Sheet1

Type in the following formulas in the appropriate cells and use the hand fill tool to generate the results for the subsequent cells in that column:

1. For the BASIC SALARY column, place your cursor in cell D3 and type the following formula:

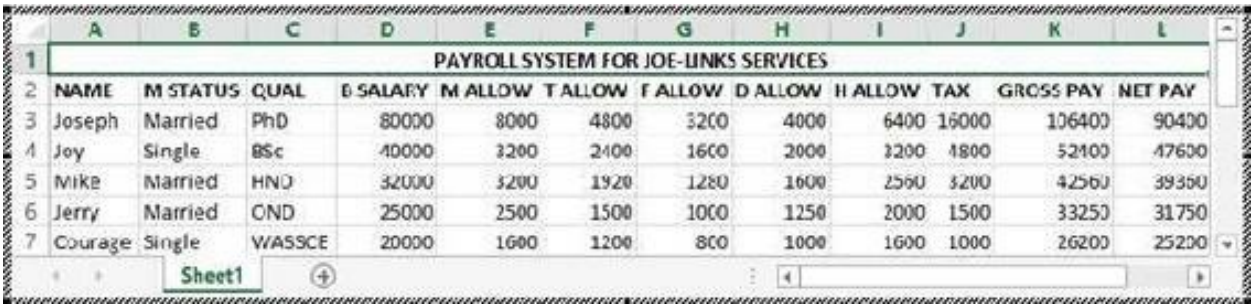
   =IF(C4="WASSCE",20000,IF(C4="OND",25000,IF(C4="NCE",280 press Enter key.

2. For the MARITAL ALLOWANCE column, place your cursor in cell E3 and type the following formula:
   =IF(B3="Single",D3*8%,IF(B3="Married",D3*10%,0)) press Enter key.
3. For the TRANSPORT ALLOWANCE column, place your cursor in cell F3 and type the following formula:
   =D3*6% press Enter key.
4. For the FEEDING ALLOWANCE column, place your cursor in cell G3 and type the following formula:
   =D3*4% press Enter key.
5. For the DRESSING ALLOWANCE column, place your cursor in cell H3 and type the following formula:
   =D3*5% press Enter key.
6. For the HOUSING ALLOWANCE column, place your cursor in cell E3 and type the following formula:
   =D3*8% press Enter key.
7. For the TAX column, place your cursor in cell J3 and type the following formula:
   =IF(C3="WASSCE",D3*5%,IF(C3="OND",D3*6%,IF(C3="NCE",I press Enter key.
8. For the GROSS PAY column, place your cursor in cell K3 and type the

following formula:
=SUM(D3:I3) press Enter key.

9. For the NET PAY column, place your cursor in cell L3 and type the following formula:
=K3-J3 press Enter key.

The completed Payroll System is shown below.



	A	B	C	D	E	F	G	H	I	J	K	L
1	PAYROLL SYSTEM FOR JOE-LINKS SERVICES											
2	NAME	M STATUS	QUAL	B SALARY	M ALLOW	T ALLOW	F ALLOW	D ALLOW	H ALLOW	TAX	GROSS PAY	NET PAY
3	Joseph	Married	PhD	80000	8000	4800	3200	4000	6400	16000	106400	90400
4	Joy	Single	BSc	40000	3200	2400	1600	2000	3200	4800	52400	47600
5	Mike	Married	HND	32000	3200	1920	1280	1600	2560	3200	42560	39360
6	Jerry	Married	OND	25000	2500	1500	1000	1250	2000	1500	33250	31750
7	Courage	Single	WASSCE	20000	1600	1200	800	1000	1600	1000	26200	25200

Sheet1

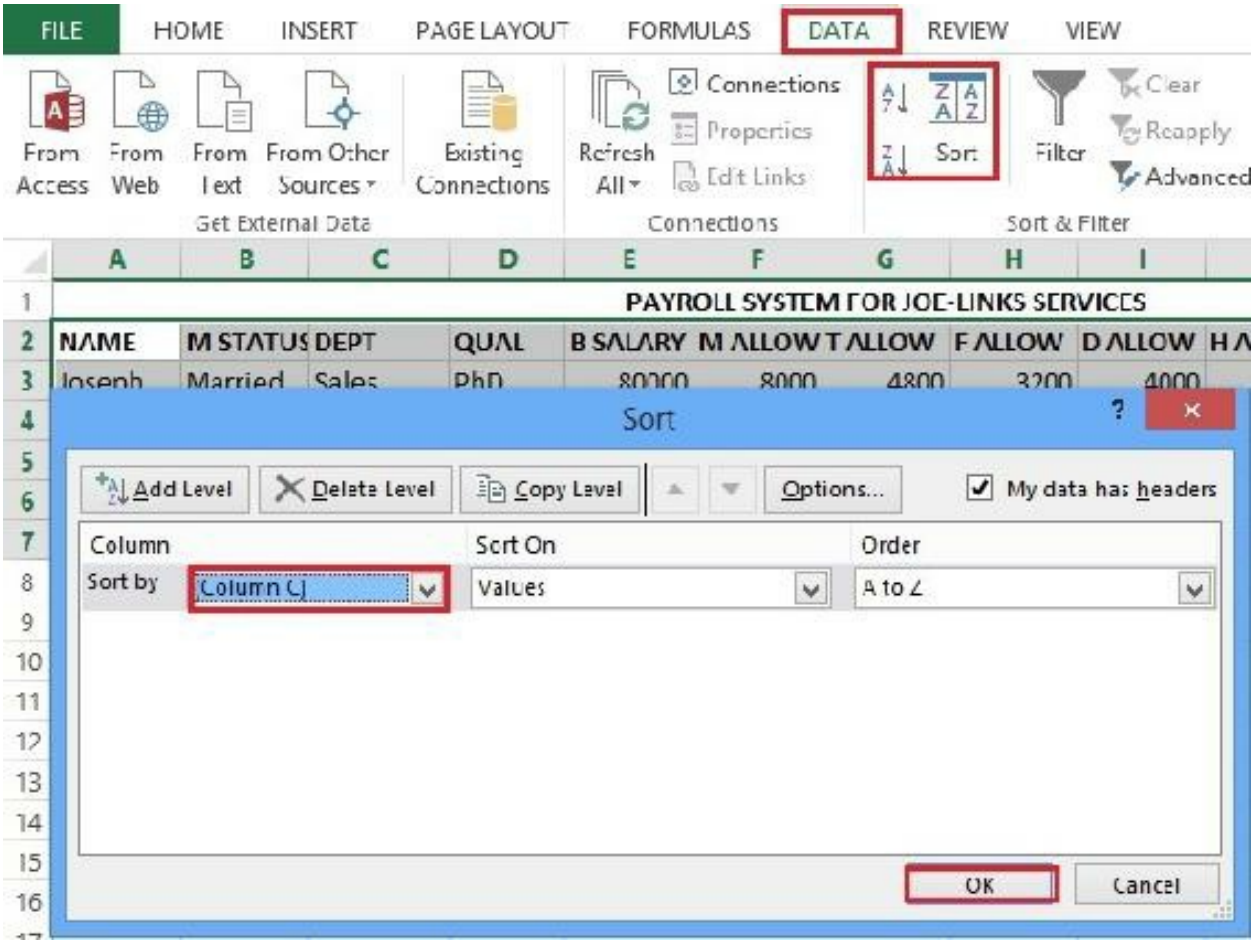
10. Create the three ranges of data. Type “Married” in the **M Status** column under the criteria range. Type “BSc” in the **Qual** column under the criteria range.
Use the procedure for performing Advance filter to filter the database based on the specified criteria.
You might need to revisit chapter 2 for the procedure in advance filter.

SUBTOTAL AND HOW TO APPLY IT IN AN EXCEL WORKSHEET

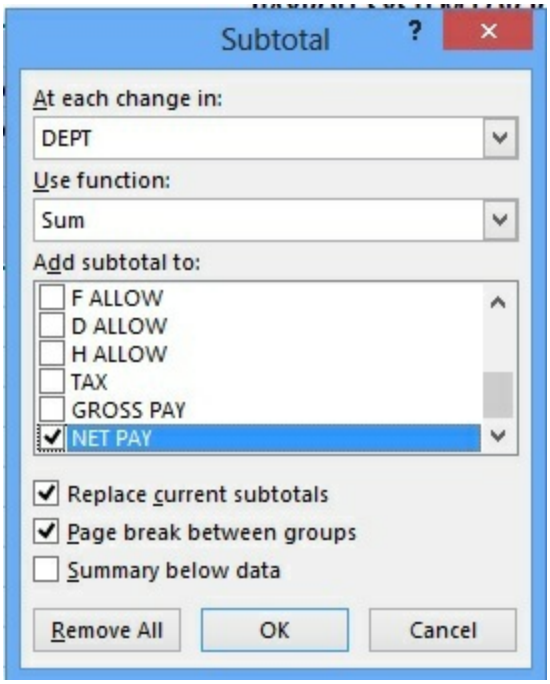
Subtotal is an Excel tool used to calculate the total value or amount spent in a particular group of records in a database. It is mainly used in Payroll and Budget Control Systems to calculate the total amount spent in each department of a company.

To Apply Subtotal to a Database in an Excel Worksheet:

1. Prepare and activate the worksheet containing the database you wish to use, for example, a payroll database.
2. Sort the records using the **Department** column as your sorting field by clicking **Sort** located in the **Sort & Filter** group in the **Data** tab. Select the sort column from the **Sort By** drop down menu and click **OK** as shown below.



3. Click on **Subtotal** located in the **Outline** group of **Data** tab. The subtotal dialogue box appears.
4. Specify the changing field from the **AT EACH CHANGE IN** drop down menu which in this case should be the **Department** column.
5. Specify the **ADD SUBTOTAL TO** field. In the case of a payroll system, specify either the **Gross Pay** or the **Net Pay** column depending on your intension.
6. Put a check the **Replace current subtotals** and **Page break between groups** boxes and click **OK** as shown below.



Excel does the calculation for you and returns the values in a row below the last record in each group as shown below.

PAYROLL SYSTEM FOR JOE-LINKS SERVICES												
NAME	M STATUS	DEPT	QUAL	B SALARY	M ALLOW	T ALLOW	F ALLOW	D ALLOW	H ALLOW	TAX	GROSS PA	NET PAY
		Grand Total										234310
		Marketing Total										72800
Joy	Single	Marketing	BSc	40000	3200	2400	1600	2000	3200	4800	52400	47600
Courage	Single	Marketing	WASSCE	20000	1600	1200	800	1000	1600	1000	26200	25200
		Sales Total										161510
Joseph	Married	Sales	PHD	80000	8000	4800	3200	4000	6400	16000	106400	90400
Mike	Married	Sales	HND	32000	3200	1920	1280	1600	2560	3200	42560	39360
Jerry	Married	Sales	OND	25000	2500	1500	1000	1250	2000	1500	33250	31750

SOME PRACTICAL EXERCISES UNDER GRADE LIST SYSTEM AND PAYROLL SYSTEM

Please attempt these sample questions:

1. Government Secondary School Owerri wants to computerize her students result in the following subjects:
   English, Mathematics, Chemistry, Physics, Biology, Economics, Literature and Government.
   a.) As a Spreadsheet Manager, design a result System to compute the Total Score and Average Score.
   b.) Using IF function, generate the grade letters for each subject and the overall grade using the following grade Scheme:
   0 – 39.9 = Fail
   40 – 49.9 = Pass
   50 – 59.9 = Credit
   60 – 69.9 = Upper Credit
   70 – 100 = Distinction
   c.) Generate 30 records and Set up an advance filter to filter Science Students from Imo State.
2. a.) Zenith Bank PLC wants to computerize her worker's payroll system to compute the Basic Salary based on the following qualifications:
   SSCE = $1200
   NCE = $1300
   HND = $1500
   BSc = $1800
   MSc = $2200
   PhD = $2800
   b.) Compute 8%, 12%, 7.5%, 6% and 5% of the Basic Salary as Housing, Transport, Medical, Feeding and Dressing allowances.
   c.) Tax deduction should be calculated as follows:
   SSCE = 1.5%
   NCE = 2%
   HND = 2.5%
   BSc = 3%
   MSc = 3.5%

PhD = 4%
d.) Calculate the Gross and Net Pay.
e.) Set up a subtotal to calculate the total amount spent in each department.

REGRESSION ANALYSIS USING THE FORECAST AND TREND FUNCTIONS

This helps you to use the relationship you create to predict for future development and growth. The FORECAST and TREND functions are used to perform linear regression analysis. These functions find the straight line relationship between one or more independent variables and a single dependent variable.

Independent variables are the variables needed to determine a prediction. The dependent variable is the variable for which you have current information or values but wish to predict its future state or values.

Regression analysis can only be useful when you believe that changes in one set of variables is caused by the interaction between the dependent and independent variables.

HOW TO USE THE FORECAST FUNCTION TO PREDICT FUTURE SALES IN EXCEL

Forecasting is the use of the known values, events or information about an event to predict its future occurrence or state. With MS-Excel, you can easily apply sophisticated statistical analysis techniques to your data. You can also use these techniques to stock prices, project expenses and other business trends.

The FORECAST function calculates, or predicts, a future value by using existing values. The predicted value is a y-value for a given x-value. The known values are existing x-values and y-values, and the new value is predicted by using linear regression. You can use this function to predict future sales, inventory requirements, or consumer trends.

The syntax is:

FORECAST(x, known_y's, known_x's)

The FORECAST function syntax has the following arguments (argument: A value that provides information to an action, an event, a method, a property, a function, or a procedure.):

- **X** (Required) is the data point for which you want to predict a value.
- **Known_y's** (Required) is the dependent array or range of data.
- **Known_x's** (required) is the independent array or range of data.

NOTES:

- If x is nonnumeric, FORECAST returns the #VALUE! error value.
- If **known_y's** and **known_x's** are empty or contain a different number of data points, FORECAST returns the #N/A error value.
- If the variance of **known_x's** equals zero, then FORECAST returns the #DIV/0! error value.

PRACTICAL APPLICATIONS OF FORECAST FUNCTION IN SALES IN MS-EXCEL

Like I said earlier, the FORECAST function can be applied in various field. I will illustrate how the function is used to predict Sales and how to call up the function.

QUESTION:

The table shown in the spreadsheet is a Sales Record of Joe-links Services for the year 2016. Use the data in the figure below to predict the sales for the month of August.

	A	B	C
1	SALES RECORD		
2	MONTH	NO SOLD	TOTAL SALES
3	Jan	1	10000
4	Feb	2	12800
5	Mar	3	8000
6	Apr	4	14000
7	May	5	18000
8	Jun	6	16000
9	Jul	7	15000
10	Aug	8	

Sheet

SOLUTION TO THE FORECAST QUESTION

Prepare your worksheet as shown above and type the following formula in cell C10:

= FORECAST(B10,C3:C9,B3:B9) press Enter key.

Excel does the underground calculation and produces a value **17885.71429** as the result.

HOW TO USE THE TREND FUNCTION TO PREDICT FUTURE SALES IN EXCEL

A sales trend determines whether sales will continue to increase or decrease and how fast (i.e. rate of increase or decrease). The TREND function is used to predict the results for the next several months even if you don't have reliable results from the previous months, unlike the FORECAST function which is used to determine for the immediate next month.

The function returns values along a linear trend. Fits a straight line (using the method of least squares) to the arrays **known_y's** and **known_x's**. Returns the **y-values** along that line for the array of **new_x's** that you specify.

The TREND function Syntax is:

TREND(known_y's, [known_x's], [new_x's], [const])

The TREND function syntax has the following arguments:

- **Known_y's** (required) - The set of y-values you already know in the relationship **y = mx + b**.

If the array known_y's is in a single column, then each column of known_x's is interpreted as a separate variable.

If the array known_y's is in a single row, then each row of known_x's is interpreted as a separate variable.

- **Known_x's** (required) - An optional set of x-values that you may already know in the relationship y = mx + b.

The array known_x's can include one or more sets of variables. If only one variable is used, known_y's and known_x's can be ranges of any shape, as long as they have equal dimensions. If more than one variable is used, known_y's must be a vector (that is, a range with a height of one row or a width of one column).

If known_x's is omitted, it is assumed to be the array {1,2,3,...} that is the same size as known_y's.

- **New_x's** (required) - New x-values for which you want TREND to return corresponding y-values.

New_x's must include a column (or row) for each independent variable, just as known_x's does. So, if known_y's is in a single column, known_x's and new_x's must have the same number of columns. If known_y's is in a single row, known_x's and new_x's must have the same number of rows.

If you omit new_x's, it is assumed to be the same as known_x's.

If you omit both known_x's and new_x's, they are assumed to be the array {1,2,3,...} that is the same size as known_y's.

- **Const** (optional) - A logical value specifying whether to force the constant b to equal 0.

If const is TRUE or omitted, b is calculated normally.

If const is FALSE, b is set equal to 0 (zero), and the m-values are adjusted so that y = mx.

NOTES:

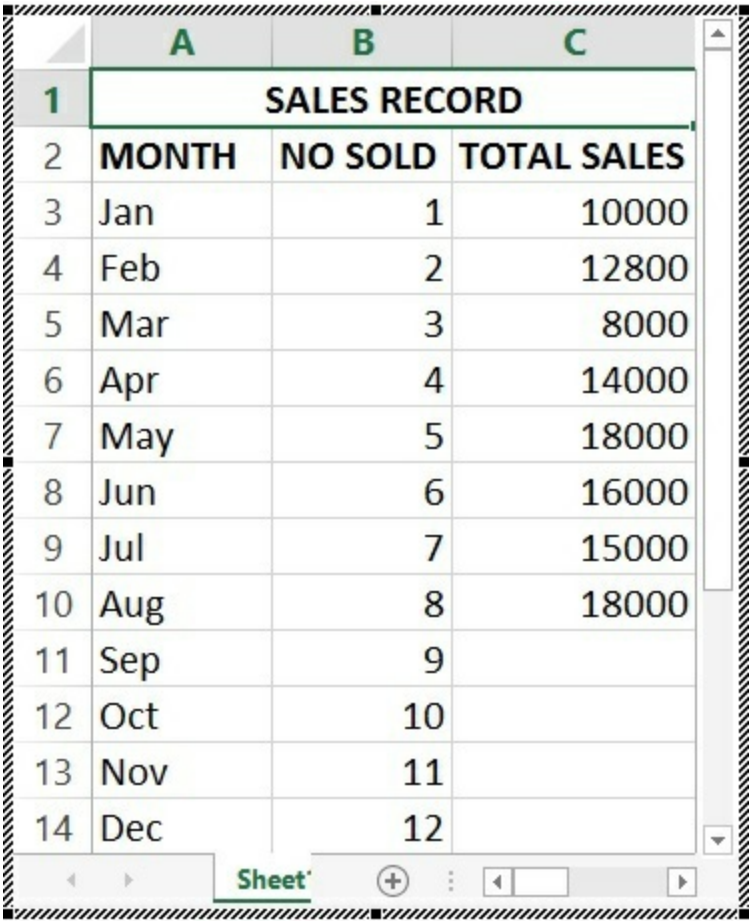
- You can use TREND for polynomial curve fitting by regressing against the same variable raised to different powers. For example, suppose column A contains y-values and column B contains x-values. You can enter x^2 in column C, x^3 in column D, and so on, and then regress columns B through D against column A.
- Formulas that return arrays must be entered as array formulas.
- In Excel Web App you cannot create array formulas.
- When entering an array constant for an argument such as known_x's, use commas to separate values in the same row and semicolons to separate rows.

PRACTICAL APPLICATION OF TREND FUNCTION IN SALES

The TREND function is more complicated than the FORECAST function. I will use a simple case of a sales record to illustrate the application of the TREND function.

QUESTION:

The table shown in the spreadsheet is a Sales Record of Joe-links Services for the year 2016. Use the data in the figure below to predict the sales for the months of September to December.



	A	B	C
1	SALES RECORD		
2	MONTH	NO SOLD	TOTAL SALES
3	Jan	1	10000
4	Feb	2	12800
5	Mar	3	8000
6	Apr	4	14000
7	May	5	18000
8	Jun	6	16000
9	Jul	7	15000
10	Aug	8	18000
11	Sep	9	
12	Oct	10	
13	Nov	11	
14	Dec	12	

Sheet

SOLUTION TO THE TREND QUESTION

Prepare your worksheet as shown above and type the following formula in cell C11:

= TREND(C3:C10,B3:B10,B11) press Enter key.

Use the fill handle to get the values for the subsequent months.

Excel does the underground calculation and returns a set of values in the appropriate cells as shown below.

	A	B	C
1	SALES RECORD		
2	MONTH	NO SOLD	TOTAL SALES
3	Jan	1	10000
4	Feb	2	12800
5	Mar	3	8000
6	Apr	4	14000
7	May	5	18000
8	Jun	6	16000
9	Jul	7	15000
10	Aug	8	18000
11	Sep	9	19064.2857
12	Oct	10	20189.2857
13	Nov	11	21905.6122
14	Dec	12	21974.1071

BUSINESS APPLICATIONS OF EXCEL SUMIF, COUNTIF AND CONCATENATE FUNCTIONS

The SUMIF, COUNTIF and CONCATENATE functions are Excel's built-in functions. These functions can also be applied practically to business systems.

COUNTIF FUNCTION

This is one of MS-Excel's Powerful Statistical functions that counts the total number of cells that met a specified condition within a specified range of cells.

The syntax for the COUNTIF function is **=COUNTIF(Range, Criteria)** press Enter.

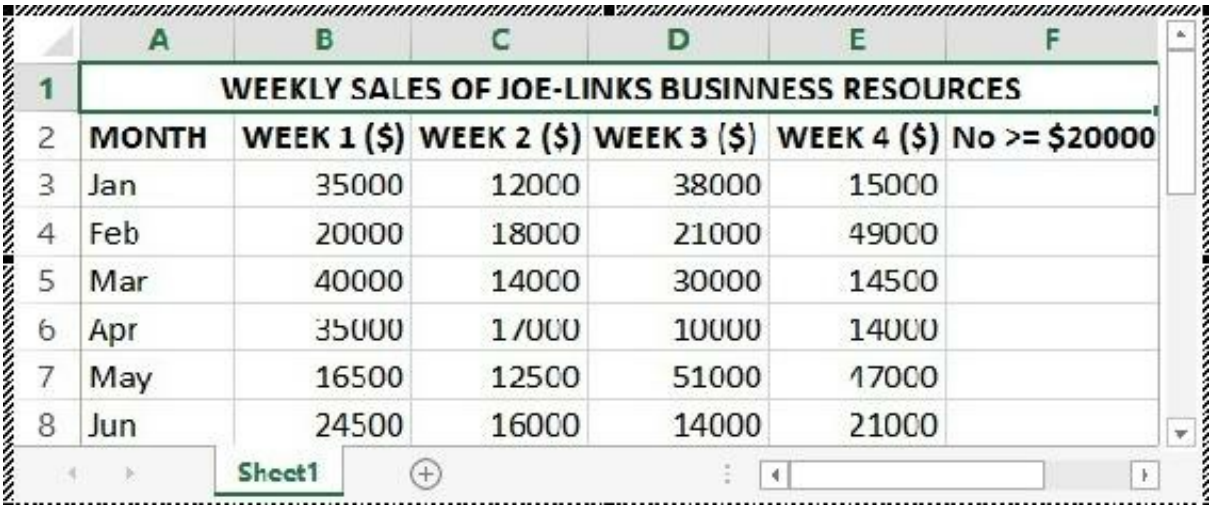
The function takes two arguments:

1. **Range:** This is the range of cells excel will count if the meet the given condition.
2. **Criteria:** This is the specified condition a cell must match before Excel can count it.

PRACTICAL ILLUSTRATION OF THE EXCEL COUNTIF FUNCTION

QUESTION

The table shown in the worksheet below is used to for recording the weekly sales of Joe-Links Business Resources for the first six weeks of the year 2016. Use the COUNTIF function to count the number of weeks for each month where the amount of sales made **is not less than $20000**.



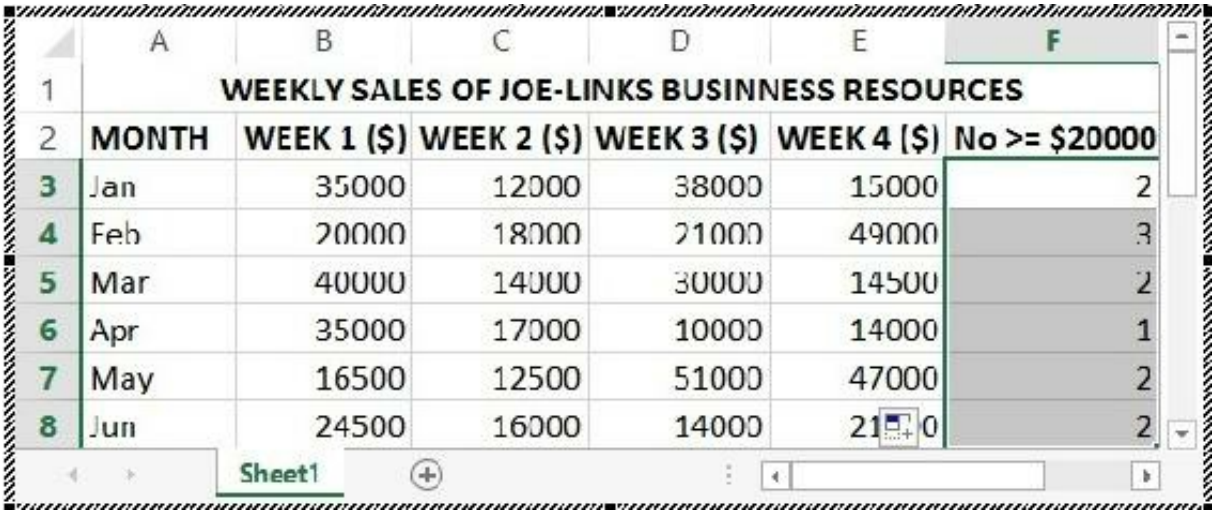
	A	B	C	D	E	F
1	WEEKLY SALES OF JOE-LINKS BUSINNESS RESOURCES					
2	MONTH	WEEK 1 ($)	WEEK 2 ($)	WEEK 3 ($)	WEEK 4 ($)	No >= $20000
3	Jan	35000	12000	38000	15000	
4	Feb	20000	18000	21000	49000	
5	Mar	40000	14000	30000	14500	
6	Apr	35000	17000	10000	14000	
7	May	16500	12500	51000	47000	
8	Jun	24500	16000	14000	21000	

Sheet1

SOLUTION TO THE COUNTIF QUESTION

1. Prepare a worksheet like the one shown in the figure above.
2. Place your cell pointer in cell **F3** and type the following syntax **=COUNTIF(B3:E3,">=20000")** press Enter. Take note of the quote in the syntax. It is mandatory.
   B3:E5 is the range of cells for the four weeks of the month January.
   ">=20000" is the criteria a cell in the range must meet before Excel counts it.
3. Use the auto fill handle to fill the subsequent spaces in the column.

The figure below contains the completed table of the question above.



	A	B	C	D	E	F
1	WEEKLY SALES OF JOE-LINKS BUSINNESS RESOURCES					
2	MONTH	WEEK 1 ($)	WEEK 2 ($)	WEEK 3 ($)	WEEK 4 ($)	No >= $20000
3	Jan	35000	12000	38000	15000	2
4	Feb	20000	18000	21000	49000	3
5	Mar	40000	14000	30000	14500	2
6	Apr	35000	17000	10000	14000	1
7	May	16500	12500	51000	47000	2
8	Jun	24500	16000	14000	21000	2

Sheet1

SUMIF FUNCTION

This is another MS-Excel's powerful function that adds the value in the cells

within a specified range that met a specified criterion with respect to the values of another specified range. The SUMIF function is similar to the COUNTIF function, but requires two ranges of data to be specified.

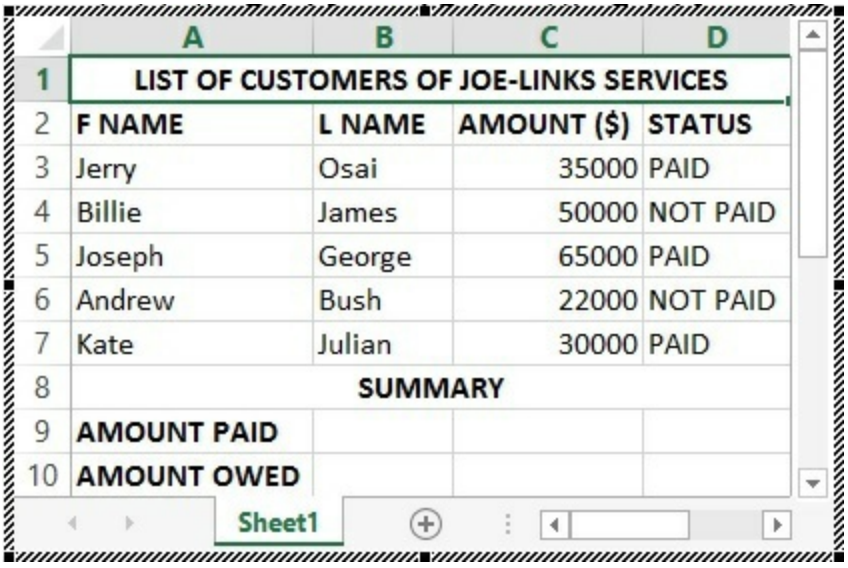
The syntax for the SUMIF function is **=SUMIF(Range,Criteria,Sum_range)** press Enter.

The function takes three arguments. The first two – The **Range** and **Criteria** are the same as in the COUNTIF function. The third argument is the **Sum_range** which is the range of cells containing the values you wish to sum with respect to the set criteria.

PRACTICAL ILLUSTRATION OF THE EXCEL SUMIF FUNCTION

QUESTION

The table contained in the figure below shows a list of individuals who ordered goods from Joe-Links Services and their payment status. In the **Status** column, PAID indicates individuals that paid for the goods they received. While NOT PAID indicates individuals that have not. Using the SUMIF function, calculate the **Total Amount Paid** and the **Total Amount Owed** by the customers.



	A	B	C	D
1	LIST OF CUSTOMERS OF JOE-LINKS SERVICES			
2	F NAME	L NAME	AMOUNT ($)	STATUS
3	Jerry	Osai	35000	PAID
4	Billie	James	50000	NOT PAID
5	Joseph	George	65000	PAID
6	Andrew	Bush	22000	NOT PAID
7	Kate	Julian	30000	PAID
8	SUMMARY			
9	AMOUNT PAID			
10	AMOUNT OWED			

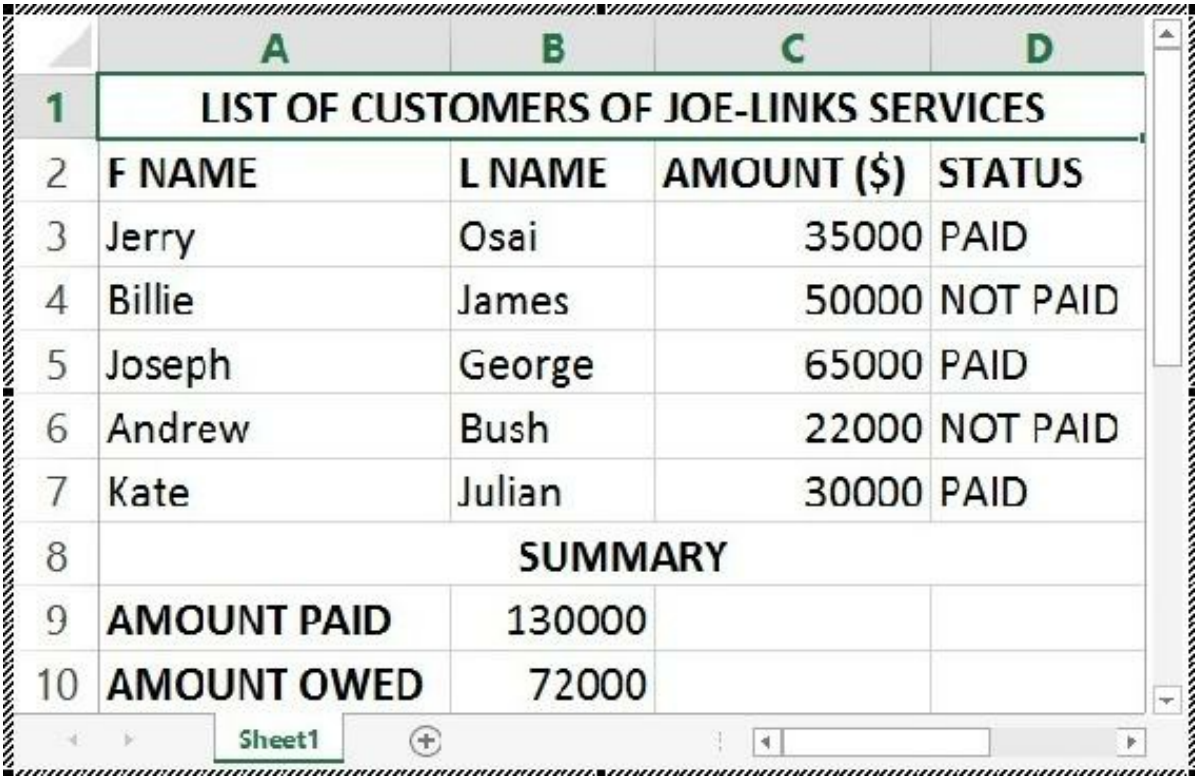
Sheet1

SOLUTION TO THE SUMIF QUESTION

1. Prepare your worksheet like the one shown in the figure above.

2. Type in the following syntax in cell B9 **=SUMIF(D3:D7,"PAID",C3:C7)** press Enter.
3. Type in the following syntax in cell B10 **=SUMIF(D3:D7,"NOT PAID",C3:C7)** press Enter.
4. **D3:D7** is the range of cells you want to check for PAID and NOT PAID values i.e. the range argument.
   PAID and **NOT PAID** are the criteria in which the sum is based i.e. the criteria argument.
   C3:C7 is the range of cells that contain the value you want add based on the specified criteria i.e. the **sum_range** argument.

Your worksheet should now look like the one in the figure below.



	A	B	C	D
1	LIST OF CUSTOMERS OF JOE-LINKS SERVICES			
2	F NAME	L NAME	AMOUNT ($)	STATUS
3	Jerry	Osai	35000	PAID
4	Billie	James	50000	NOT PAID
5	Joseph	George	65000	PAID
6	Andrew	Bush	22000	NOT PAID
7	Kate	Julian	30000	PAID
8		SUMMARY		
9	AMOUNT PAID	130000		
10	AMOUNT OWED	72000		

Sheet1

CONCATENATE FUNCTION

This is an Excel built-in function used to join two or more text items together.

The syntax for the CONCATENATE function looks like this:
=CONCATENATE(TEXT1,TEXT2,TEXT3) press Enter.

The function takes up to 255 text items. A comma is used to separate each text item. If you actually a comma or a space or any special character, you need to

treat it as a text. If the item is a text, you enclose it in double quote. A comma, space or any special character is treated as a text.

If the item is a number, or a formula, you don't need to enclose it in a double quote.

For example, the output of the CONCATENATE function:

=CONCATENATE("Keyboard","=",2," ","Mouse","=",3," ","Monitor","=",4) is:

Keyboard=2 Mouse=3 Monitor=4

HOW TO CALCULATE YOUR CGPA USING MS-EXCEL

You can use Microsoft Excel to calculate your Cumulative Grade Point Average for a session. Excel reduces the stress for you. All you need to do is to insert the insert the correct syntax in the correct column, then excel performs the calculations for you.

The illustration in this section is for a five-point grade system. But the procedure is the same for other grade systems. Also in the example below, I assumed you offered nine courses both in first and second semester. If the number of courses you offered is less or more than nine, don't panic. All you need to do is to adjust the cell references in the syntax of the function used.

The two main functions needed to design a CGPA System are the IF and SUM functions.

DEFINITIONS OF SOME CGPA TERMS USED IN THIS ILLUSTRATION

1. **UNITS:**
   This can also be referred to as Credit Unit. It is the credit load given to a course by the university management. Different courses have different credit units.
2. **GRADE SYSTEM:**
   There are different types of grade system. The two most popular grade systems are the Five-Point Grade System and the Three-Point Grade System.
   In the Five-Point Grade System, there are 6 grade letters, but only five out of the six letters are valid. The grade letters A, B, C, D, E, F represent the values 5, 4, 3, 2, 1, 0 respectively. The letter F is not valid since zero which is its value is an invalid number.
   In the Three-Point Grade System, there are 4 grade letters where only three out of the four grade letters are valid.
3. **GRADE LETTER EQUIVQLENCE:**
   As the name implies, it is the numerical equivalence of the grade letter. For example, in a Five-Point Grade System, the equivalence of the

letters A, B, C, D, E, F are 5, 4, 3, 2, 1, 0 .

4. **GP:**
   This means Grade Point. It is the value of the Grade letter equivalence multiplied by the Credit Unit.
5. **TNU:**
   This means Total Number of Units. It is the sum of the credit units of all the courses offered in a semester.
6. **TGP:**
   This means Total Grade Point. It is the sum of the grade points you made in all the courses offered in a semester.
7. **GPA:**
   This means Grade Point Average. It is the value of the TGP divided by the TNU.
8. **CTNU:**
   This means Cumulative Total Number of Units. It is the sum of the TNU for first and second semester.
9. **CTGP:**
   This means Cumulative Total Grade Point. It is the sum of the TGP for first and second semester.
10. **CGPA:**
    This means Cumulative Grade Point Average. It is the value of the TGP divided by the TNU for the academic session.

DESIGNING THE CGPA SYSTEM IN MS-EXCEL

It is now time to design the CGPA System.

Prepare the three tables - first semester, second semester and general tables on MS-Excel worksheet as shown in the figure below.

	A	B	C	D	E	F	G	H	I
1	CGPA SYSTEM								
2	FIRST SEMESTER								
3	COURSE CODE	COURSE TITLE	UNITS	GRADE	GRADE EQUIV	GP	TNU	TGP	GPA
4	BIO 101	BIOLOGY	3	B					
5	CHM 101	CHEMISTRY 1	4	B					
6	ENG 101	WORKSHOP 1	1	B					
7	ENG 103	ENG. DRAWING 1	1	A					
8	GST 103	PHILOSOPHY	1	C					
9	GST 101	ENGLISH 1	2	B					
10	MTH 101	MATHEMATICS 1	4	A					
11	PHY 101	PHYSICS 1	4	A					
12	IGB 101	IGBO 1	1	B					
13	SECOND SEMESTER								
14	COURSE CODE	COURSE TITLE	UNITS	GRADE	GRADE EQUIV	GP	TNU	TGP	GPA
15	CHM 102	CHEMISTRY 2	4	A					
16	ENG 104	ENG. DRAWING 2	1	B					
17	MTH 102	MATHEMATICS 2	4	A					
18	PHY 102	PHYSICS 2	4	A					
19	GST 108	SOCIAL SCIENCE 1	2	C					
20	GST 102	ENGLISH 2	2	B					
21	ENG 102	WORKSHOP 2	1	A					
22	GST 110	SCIENCE TECHNOLOGY & SOCIETY	1	B					
23	IGB 102	IGBO 2	1	B					
24	GENERAL								
25	CTNU	CTGP	CGPA						
26									

Sheet1

SYNTAXES FOR THE CGPA SYSTEM

For the First Semester Table:

Type in the following syntaxes in the specified cells:

1. For the GRADE EQUIVALENCE;
   Position your cell pointer in cell E4 and type the syntax:
   =IF(D4="A",5,IF(D4="B",4,IF(D4="C",3,IF(D4="D",2,IF(D4="E",
   press Enter key. Use the auto fill handle to generate the values for the subsequent cells in the column.
2. For the GP;
   Position your cell pointer in cell F4 and type the syntax:
   =C4*E4 press Enter key. Use the auto fill handle to generate the values for the subsequent cells in the column.
3. For the TNU;

Position your cell pointer in cell G4 and type the syntax:
=SUM(C4:C12) press Enter key.

4. For the TGP;
   Position your cell pointer in cell H4 and type the syntax:
   =SUM(F4:F12) press Enter key.
5. For the GPA;
   Position your cell pointer in cell I4 and type the syntax:
   =H4/G4 press Enter key.

For the Second Semester Table:

Type in the following syntaxes in the specified cells:

1. For the GRADE EQUIVALENCE;
   Position your cell pointer in cell E15 and type the syntax:
   =IF(D15="A",5,IF(D15="B",4,IF(D15="C",3,IF(D15="D",2,IF(D15
   press Enter key. Use the auto fill handle to generate the values for the subsequent cells in the column.
2. For the GP;
   Position your cell pointer in cell F15 and type the syntax:
   =C15*E15 press Enter key. Use the auto fill handle to generate the values for the subsequent cells in the column.
3. For the TNU;
   Position your cell pointer in cell G15 and type the syntax:
   =SUM(C15:C23) press Enter key.
4. For the TGP;
   Position your cell pointer in cell H15 and type the syntax:
   =SUM(F15:F23) press Enter key.
5. For the GPA;
   Position your cell pointer in cell I15 and type the syntax:
   =H15/G15 press Enter key.

For the General Table:

Type in the following syntaxes in the specified cells:

1. For the CTNU;
   Position your cell pointer in cell A26 and type the syntax:
   =G4+G15 press Enter.
2. For the CTGP;

Position your cell pointer in cell B26 and type the syntax:
=H4+H15 press Enter.

3. For the CGPA;
   Position your cell pointer in cell C26 and type the syntax:
   =B26/A26 press Enter key.

Your completed CGPA System should resemble the one shown in the figure below.

	A	B	C	D	E	F	G	H	I
1			CGPA SYSTEM						
2			FIRST SEMESTER						
3	COURSE CODE	COURSE TITLE	UNITS	GRADE	GRADE EQUIV	GP	TNU	TGP	GPA
4	BIO 101	BIOLOGY	3	B	4	12	21	92	4.38
5	CHM 101	CHEMISTRY 1	4	B	4	16			
6	ENG 101	WORKSHOP 1	1	B	4	4			
7	ENG 103	ENG. DRAWING 1	1	A	5	5			
8	GST 103	PHILOSOPHY	1	C	3	3			
9	GST 101	ENGLISH 1	2	B	4	8			
10	MTH 101	MATHEMATICS 1	4	A	5	20			
11	PHY 101	PHYSICS 1	4	A	5	20			
12	IGB 101	IGBO 1	1	B	4	4			
13			SECOND SEMESTER						
14	COURSE CODE	COURSE TITLE	UNITS	GRADE	GRADE EQUIV	GP	TNU	TGP	GPA
15	CHM 102	CHEMISTRY 2	4	A	5	20	20	91	4.55
16	ENG 104	ENG. DRAWING 2	1	B	4	4			
17	MTH 102	MATHEMATICS 2	4	A	5	20			
18	PHY 102	PHYSICS 2	4	A	5	20			
19	GST 108	SOCIAL SCIENCE 1	2	C	3	6			
20	GST 102	ENGLISH 2	2	B	4	8			
21	ENG 102	WORKSHOP 2	1	A	5	5			
22	GST 110	SCIENCE TECHNOLOGY & SOCIETY	1	B	4	4			
23	IGB 102	IGBO 2	1	B	4	4			
24			GENERAL						
25	CTNU	CTGP	CGPA						
26	41	183	4.46						

Congratulations! You have built a system for calculating your CGPA for an academic session using Microsoft Excel.

REFERENCING CELLS, DATA AND FORMULAS IN OTHER WORKSHEETS OF AN EXCEL WORKBOOK

In the chapter one of this tutorial, I illustrated how you can reference data, cell and formulas in the same worksheet of Microsoft Excel. You can also reference cells and formulas on other worksheets of the same workbook in Excel.

This is useful when you have related data in different worksheets of a workbook which you want to analyze in another worksheet of that same workbook.

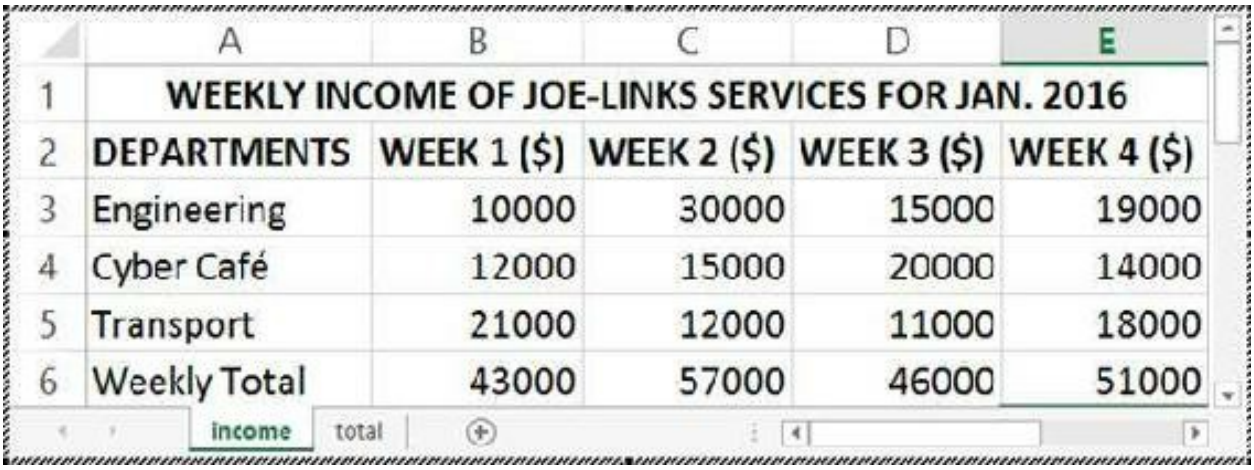
To reference a cell in another worksheet, you begin by typing the equality sign (=), followed by the referenced worksheet name, followed by an exclamation mark also known as bang (!) and lastly, you type the absolute cell reference of the cell, e.g. A1.

The syntax for referencing a data cell in another worksheet is:
=Referenced_worksheet_name!absolute_cell_reference_of_the_cell

PRACTICAL ILLUSTRATION OF REFERENCING A DATA CELL IN ANOTHER WORKSHEET

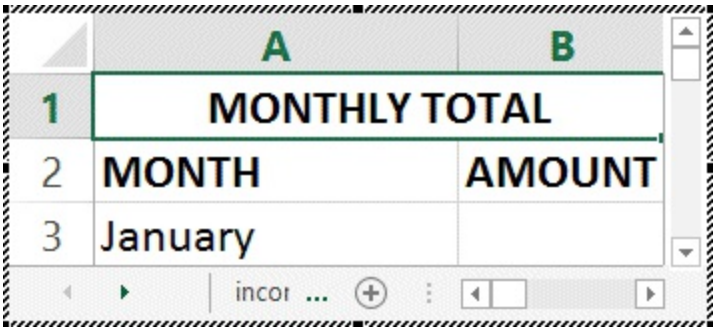
QUESTION:

Joe-Links Services made use of two worksheets of a workbook to record the weekly income from its various departments for the month of January 2016 as shown in the figure below. The first worksheet contains the various departments, the weekly income made by each department and the weekly total income of all the departments. The second worksheet will contain the sum of the various weekly totals. Assuming the worksheet names are **Income** and **Total** respectively, calculate the total of the weekly income inside the second worksheet (Total).



	A	B	C	D	E
1	WEEKLY INCOME OF JOE-LINKS SERVICES FOR JAN. 2016				
2	DEPARTMENTS	WEEK 1 ($)	WEEK 2 ($)	WEEK 3 ($)	WEEK 4 ($)
3	Engineering	10000	30000	15000	19000
4	Cyber Café	12000	15000	20000	14000
5	Transport	21000	12000	11000	18000
6	Weekly Total	43000	57000	46000	51000

income total

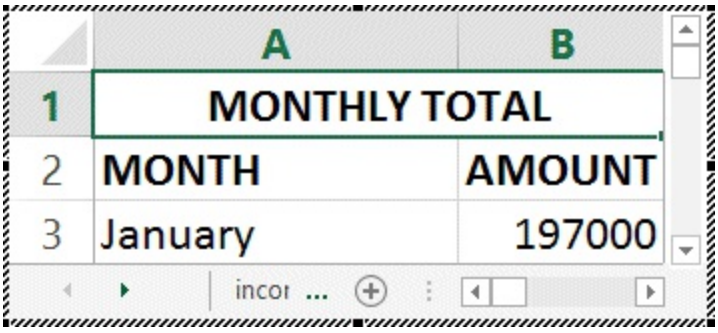


	A	B
1	MONTHLY TOTAL	
2	MONTH	AMOUNT
3	January	

incor ...

SOLUTION TO THE ABOVE QUESTION

1. Prepare the two worksheets as shown in the figures above and rename them to **income** and **total** respectively.
2. Activate the second worksheet (total) and type in any of the following formulas in cell B2:
   =SUM(income!B6:income!E6) and press Enter.
   OR type this:
   =income!B6+income!C6+income!D6+income!E6 and press Enter.
   The two functions returns the same value. The first one is a built-in function and I made use of range. While the second function is the normal addition.
   income! refers to the reference worksheet name from which you get your values.
   The second worksheet should now contain the returned value as shown in the figure below.



	A	B
1	MONTHLY TOTAL	
2	MONTH	AMOUNT
3	January	197000

THE LOOKUP BUILT-IN FUNCTION IN EXCEL

This is an Excel built-in function that returns a data in a cell of a particular row using a provided data in another cell of that same row as reference or criteria.

For example, if you have a worksheet made up of two columns namely: ID and PRODUCT, we can use a particular ID under the ID column (say 101) to find the product name corresponding to that ID.

There are two types of LOOKUP functions in Excel namely: VECTOR LOOKUP function and ARRAY LOOKUP function, but the latter is beyond the scope of this tutorial.

The syntax for the VECTOR LOOKUP function is:
=LOOKUP(lookup_value,lookup_vector,[result_vector])

The function takes 3 arguments:

1. **lookup_value (required):** This is the provided data or cell reference of the provided data that Excel uses to lookup a data in another cell of the same row. ***Lookup_value*** can be a number, text, a logical value, or a name or reference that refers to a value. In the case of the example above, it will be the ID 101 or its relative cell reference e.g. A2.
2. **lookup_value (required):** This is the specified range of data used to search for a particular data in that range of data. The values in ***lookup_vector*** can be text, numbers, or logical values. In the case of the above example, it will be the ID column data range e.g. A2:A10.
   Note that the values in ***lookup_vector*** must be placed in ascending order: ..., -2, -1, 0, 1, 2, ..., A-Z, FALSE, TRUE; otherwise, **LOOKUP** might not return the correct value. Uppercase and lowercase text are equivalent.
3. **result_vector (optional):** This is the range of columns that contains the data that Excel returns. The ***result_vector*** argument must be the same size as ***lookup_vector***. In the case of the above example, it will be the PROCDUCT column data range e.g. B2:B10.

NOTE:

- When dealing with number columns, you must first sort the whole data

either in ascending or descending order before typing the LOOKUP function else Excel returns an error message #N/A.

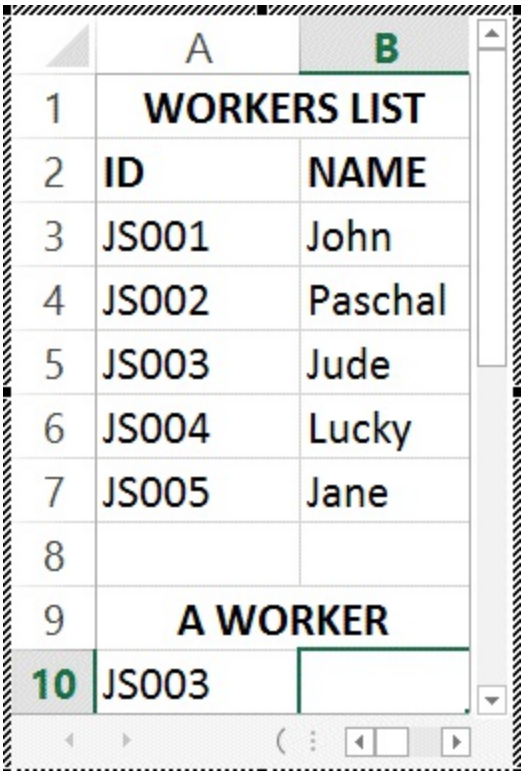
- If the LOOKUP function can't find the lookup_value, the function matches the largest value in lookup_vector that is less than or equal to lookup_value.
- If lookup_value is smaller than the smallest value in lookup_vector, LOOKUP returns the #N/A error value.

Now let me use a more practical illustration to get put you through.

PRACTICAL ILLUSTRATION OF LOOKUP FUNCTION (VECTOR LOOKUP)

QUESTION:

The figure below shows a spreadsheet that contains a list of workers and their ID. Use the LOOKUP function to find the worker with ID equal to **JS003.**



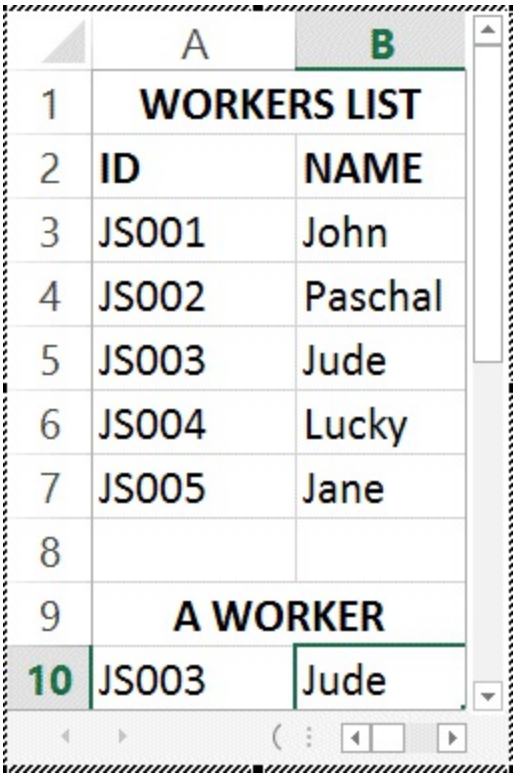
	A	B
1	WORKERS LIST	
2	ID	NAME
3	JS001	John
4	JS002	Paschal
5	JS003	Jude
6	JS004	Lucky
7	JS005	Jane
8		
9	A WORKER	
10	JS003	

SOLUTION TO THE LOOKUP QUESTION

1. Prepare a worksheet as shown in the figure above.
2. Highlight the whole data (i.e. A3 to B7).

3. The ID column is already in descending order, therefore there is no need to resort it again.
4. Place your cell pointer in cell B10 and type the following formula: **=LOOKUP(A5,A3:A7,B3:B7)** and press Enter key.

Excel returns the name JUDE, the worker with the ID JS003 as shown in the figure below.



	A	B
1	**WORKERS LIST**	
2	**ID**	**NAME**
3	JS001	John
4	JS002	Paschal
5	JS003	Jude
6	JS004	Lucky
7	JS005	Jane
8		
9	**A WORKER**	
10	JS003	Jude

There is more this function can do than this. I just used this illustration to put you through. Now it is time for you to utilize this knowledge in more practical problems.

Now, I will show you a similar function to LOOKUP called VLOOKUP function and how it works.

THE VLOOKUP BUILT-IN FUNCTION IN EXCEL

The VLOOKUP function is similar to the LOOKUP function. The V in VLOOKUP stands for vertical. Like the LOOKUP function, the whole data must be sorted first before Excel can return a result. VLOOKUP function is used to search a specified range of column(s) of a spreadsheet for a value. If the value is found, Excel can now return data from another cell in the same row with the lookup value.

The syntax for the VLOOKUP function is:

=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

The function takes four arguments:

1. **lookup_value (required):** This is the value to search in the first column of the table or range. The ***lookup_value*** argument can be a value or a reference. If the value you supply for the l***ookup_value*** argument is smaller than the smallest value in the first column of the ***table_array*** argument, **VLOOKUP** returns the #N/A error value.
2. **table_array (required):** This is the range of cells that contains the data. You can use a reference to a range (for example, **A2:D8**), or a range name. The values in the first column of ***table_array*** are the values searched by ***lookup_value***. These values can be text, numbers, or logical values. Uppercase and lowercase text are equivalent.
3. **col_index_num (required):** This is the column number in the ***table_array*** argument from which the matching value must be returned. A ***col_index_num*** argument of 1 returns the value in the first column in ***table_array***; a ***col_index_num*** of 2 returns the value in the second column in ***table_array***, and so on.
   If the ***col_index_num*** argument is:
   - Less than 1, **VLOOKUP** returns the #VALUE! error value.
   - Greater than the number of columns in ***table_array***, **VLOOKUP** returns the #REF! error value.
4. **range_lookup (optional):** This is the fourth argument and it is optional. A logical value that specifies whether you want **VLOOKUP** to find an exact match or an approximate match:

- If ***range_lookup*** is either TRUE or is omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than ***lookup_value*** is returned.
- If ***range_lookup*** is either TRUE or is omitted, the values in the first column of ***table_array*** must be placed in ascending sort order; otherwise, **VLOOKUP** might not return the correct value.
- If ***range_lookup*** is FALSE, the values in the first column of ***table_array*** do not need to be sorted.
- If the ***range_lookup*** argument is FALSE, **VLOOKUP** will find only an exact match. If there are two or more values in the first column of ***table_array*** that match the ***lookup_value***, the first value found is used. If an exact match is not found, the error value #N/A is returned.

NOTES:

- When searching text values in the first column of ***table_array***, ensure that the data in the first column of ***table_array*** does not contain leading spaces, trailing spaces, inconsistent use of straight (' or ") and curly (‘ or “) quotation marks, or nonprinting characters. In these cases, **VLOOKUP** might return an incorrect or unexpected value.
- When searching number or date values, ensure that the data in the first column of ***table_array*** is not stored as text values. In this case, **VLOOKUP** might return an incorrect or unexpected value.
- If range_lookup is FALSE and ***lookup_value*** is text, you can use the wildcard characters — the question mark (?) and asterisk (*) — in ***lookup_value***. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) preceding the character.

For example, using the same worksheet I used to illustrate the **LOOKUP function,** to find a worker with ID equal to **JS001**, enter the following formula in cell B10:

=VLOOKUP(A3, A3:B7, 2, FALSE) and press Enter key.

The function should return JOHN, the name that matches the ID, JS001.

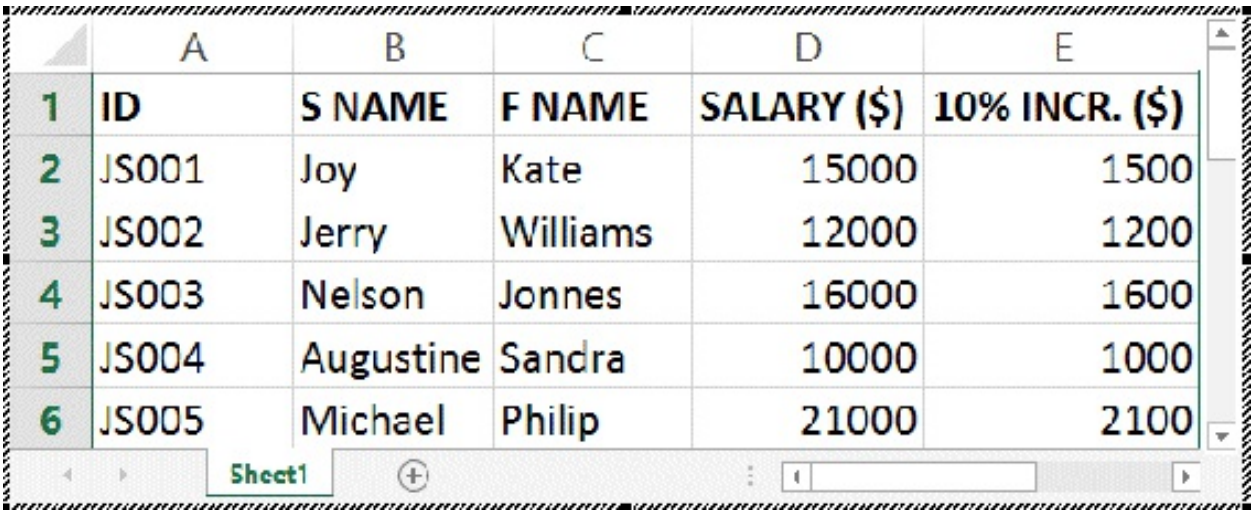
PRACTICAL ILUSTRATION: PERFORMING CALCULATIONS USING VLOOKUP FUNCTION

DESIGNING A PAYROLL SYSTEM USING VLOOKUP FUNCTION

You can also use the LOOKUP function to perform some calculations. For example:

QUESTION:

Using the information contained in the worksheet shown in the figure below, design a payroll system containing the workers' details and a pay slip in the same worksheet. Also calculate the New Salary inside the pay slip.

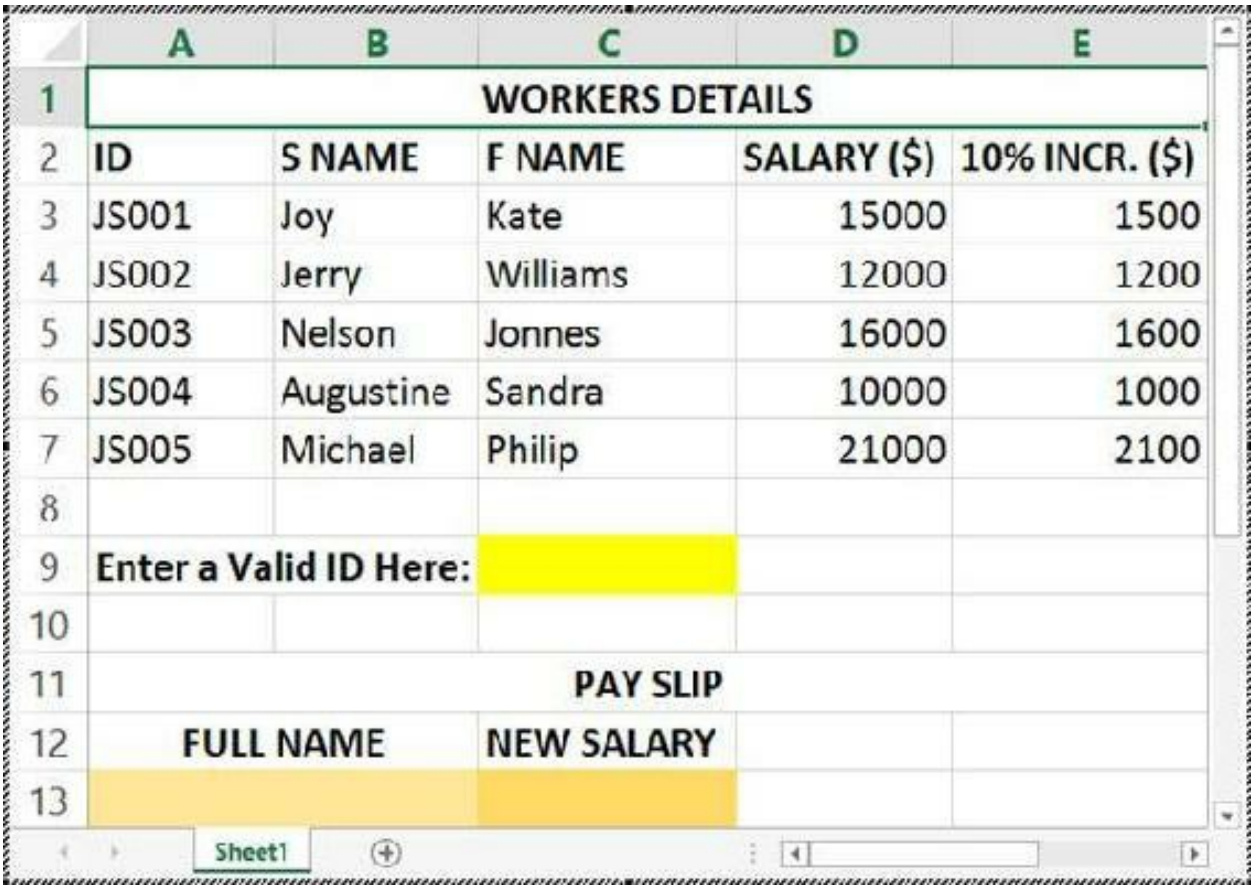


	A	B	C	D	E
1	ID	S NAME	F NAME	SALARY ($)	10% INCR. ($)
2	JS001	Joy	Kate	15000	1500
3	JS002	Jerry	Williams	12000	1200
4	JS003	Nelson	Jonnes	16000	1600
5	JS004	Augustine	Sandra	10000	1000
6	JS005	Michael	Philip	21000	2100

Sheet1

SOLUTION TO THE ABOVE PAYROLL SYSTEM EXERCISE

1. Prepare your worksheet as shown in the figure below.



	A	B	C	D	E
1			WORKERS DETAILS		
2	ID	S NAME	F NAME	SALARY ($)	10% INCR. ($)
3	JS001	Joy	Kate	15000	1500
4	JS002	Jerry	Williams	12000	1200
5	JS003	Nelson	Jonnes	16000	1600
6	JS004	Augustine	Sandra	10000	1000
7	JS005	Michael	Philip	21000	2100
8					
9	Enter a Valid ID Here:				
10					
11			PAY SLIP		
12	FULL NAME		NEW SALARY		
13					

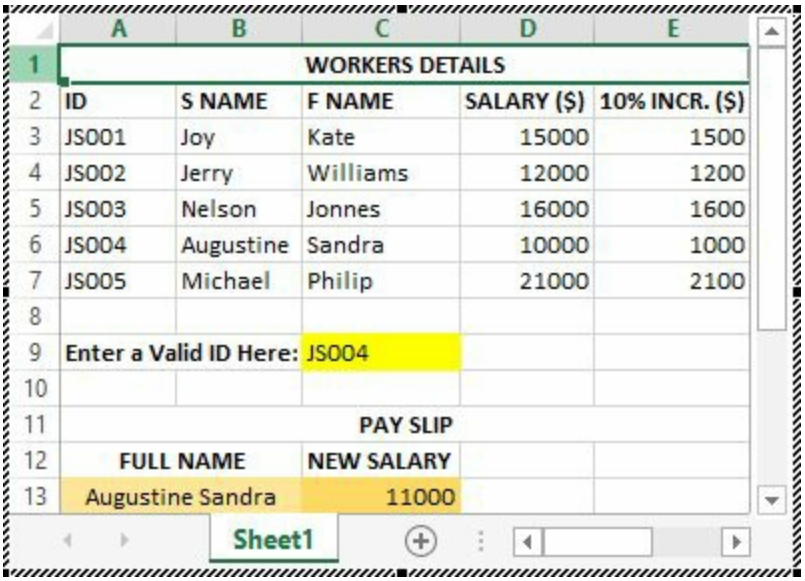
Sheet1

2. Type in the following formula in cell A13 (the yellow cell): **=CONCATENATE(VLOOKUP(C9,A3:E7,2,FALSE)," ",VLOOKUP(C9,A3:E7,3,FALSE))** and press Enter key.
   The CONCATENATE function above has 3 arguments:
   The first argument is generated by the VLOOKUP function nested in the CONCATENATE and it returns the surname of the worker whose ID is equal to the value entered in cell C9.
   The second argument returns a space.
   The third argument returns the last name of the worker whose ID is equal to the value entered in cell B9.
   The Three returned argument combined together gives the full name of the worker whose ID is entered in cell C9.
3. Type in the following formula in cell C13 (under the FULL NAME column): **=VLOOKUP(C9,A3:E7,4,FALSE)+VLOOKUP(C9,A3:E7,5,FALSE)** and press Enter key.
   The first VLOOKUP function in the formula above returns the salary of

the worker whose ID is entered in cell C9.
The second VLOOKUP function returns the value of the 10% salary increment of the same worker.

The sum of the value returned by both function gives the new salary of the worker.

If you got everything right then your workbook should look like the one shown below.



	A	B	C	D	E
1	WORKERS DETAILS				
2	ID	S NAME	F NAME	SALARY ($)	10% INCR. ($)
3	JS001	Joy	Kate	15000	1500
4	JS002	Jerry	Williams	12000	1200
5	JS003	Nelson	Jonnes	16000	1600
6	JS004	Augustine	Sandra	10000	1000
7	JS005	Michael	Philip	21000	2100
8					
9	Enter a Valid ID Here:		JS004		
10					
11			PAY SLIP		
12	FULL NAME		NEW SALARY		
13	Augustine Sandra		11000		

Sheet1

Now let me test your knowledge.

PRACTICAL EXERCISE UNDER VLOOKUP FUNCTION

1. Repeat the last illustration above, but this time use a separate worksheets of a workbook to prepare workers details table and the pay slip table of the payroll system using the same procedure shown above. Calculate the **New Salary** inside the pay slip table.

HINTS:

- Rename the first worksheet to WORKERS_DETAILS and the second worksheet to PAY_SLIP.
- Remember to use absolute cell references as shown previously.

CHAPTER 4: STORE LEDGER ACCOUNT/STOCK CONTROL

This is an account prepared to evaluate the quantity of goods bought and the quantity of goods sold. From the date of purchase of goods to the date the goods were issued out, a lot of things may have happened. Some of these incidence include: inflation, deflation, etc. When issuing out goods from the store, problems arise as to whether the original purchase price or the immediate current price of the goods should be used. This has led to different methods of pricing stock issues. Store Ledger is an accounting tool, used for accounting analysis.

In this chapter, I assumed that you are conversant with MS Excel's Worksheet operation. If not visit chapter 1 and revise Excel worksheet operations before going further into this chapter.

METHODS OF ISSUING AND PRICING STOCK GOODS

There are four common methods of pricing stock issues. They include:

1. FIFO Method
2. FIFO Method
3. Simple Average Method
4. Weighted Average Method

Other Methods Include:

1. Based Stock Method
2. Replacement Method
3. Standard Price Method
4. Actual Price Method

I am going to emphasize only on the four common methods.

FIFO METHOD

FIFO means **First In First Out**. This method emphasizes a situation whereby the first batch of goods received will be the first set to be issued out.

MERITS OF FIFO METHOD

1. FIFO method is a good representation of stock keeping since the oldest stock will be issued out first.
2. It is an actual cost system especially when no inflation or deflation period is encountered.
3. Unrealized profits does not arise since it is an actual cost system.

DEMERITS OF FIFO METHOD

1. It is cumbersome to calculate because of the number of calculations involved.
2. During the period of inflation, product's costs are over estimated. But during the period of deflation, product's costs are under estimated.

PRACTICAL/BUSINESS ILLUSTRATION OF FIFO METHOD

All these while, I have been dealing on the theoretical aspect of store ledger account. Now, let me now show you the real life application/illustration.

FIFO PRACTICAL QUESTION:

From the following information of material DNL of Mr.Bigg's Fast-food shown below, prepare a store ledger account for the month of December 2016 using FIFO method of pricing material goods.

Information:

12/01/2016 – Opening balance: 100 units at $39.00 per unit.

12/05/2016 – Received 200 units at $30 .00 per unit.

12/10/2016 – Received 250 units at $50.00 per unit.

12/12/2016 – Issued 400 units.

12/20/2016 – Received 300 units at 58.00 per unit.

12/25/2016 – Issued 200 units.

12/30/2016 – Issued 200 units.

SOLUTION TO THE FIFO QUESTION

For the first issue on 12th December, you first take the opening stock receipt which was 100 units at $39.00 per unit (100 * $39 = $3900).

Next, you take the first receipt stock on 5th December which was 200 unit at $30.00 per unit (200 * $30 = $6000).

Since you still need 100 units to complete the first 400 units issue, deduct 100 units at $50.00 (100 * $50 = 5000) from the second receipt stock on 10th December.

Then adding up the amounts will give you a total amount of $14900 as shown below.

Follow this pattern when issuing out the subsequent stocks. But remember that the receipt stock on 10th December remains 150 units. So when issuing out the second batch, you will first take it.

Prepare your stock control/store ledger account for FIFO Method in MS Excel

in 3 sections which include: RECEIPTS, ISSUES and BALANCE as shown below.

	A	B	C	D	E	F	G	H	I	J
1	MR. BIGG'S FAST FOOD									
2	STORE LEDGER ACCOUNT AS AT DECEMBER 2016									
3	MATERIAL CODE: MB/001 METHOD: FIFO									
4		RECEIPTS			ISSUES			BALANCE		
5	DATE	QTY	PRICE ($)	AMOUNT ($)	QTY	COST ($)	AMOUNT ($)	QTY	PRICE ($)	AMOUNT ($)
6	12/1/2016							100	39	3900
7	12/5/2016	200	30	6000				300		9900
8	12/10/2016	250	50	12500				550		22400
9	12/12/2016				400	37.25	14900	150		7500
10	12/20/2016	300	58	17400				450		24900
11	12/25/2016				200	52	10400	250		14500
12	12/30/2016				200	58	11600	50	58	2900

The opening stock for January 2017 was 50 units at $58.00 per unit.

CALCULATION TIPS:

Receipt Amount = Receipt Qty * Receipt Price

Issue Cost = Issue Amount / Issue Qty

Issue Amount = Issue Qty * Issue Price

Balance Price = Balance Amount / Balance Qty

LIFO METHOD

LIFO means **Last In First Out**. It emphasizes a situation whereby the last batch of goods received are issued out first.

MERITS OF LIFO METHOD

1. It is simple to operate than FIFO method.
2. The profit disclosed by LIFO method seems to be stable and can serve as a better guide to the management.

DEMERITS OF LIFO METHOD

1. LIFO method is cumbersome at times to operate due to the number of calculations involved, especially if the receipt stocks batches come in small quantities while stocks are issued out in large quantities.
2. Stock valuation at the end of the year seems to be out within the current

price level.

3. This is not a fair method especially when used to compare job cost.

PRACTICAL/BUSINESS ILLUSTRATION OF LIFO METHOD

Let me give you another practical illustration of store ledger account with LIFO method.

LIFO PRACTICAL QUESTION:

From the following information of material DNL of Vegan Fast-food shown below, prepare a store ledger account for the month of December 2015 using LIFO method of pricing material goods.

Information:

12/01/2015 – Opening balance: 100 units at $39.00 per unit.

12/05/2015 – Received 200 units at $30 .00 per unit.

12/10/2015 – Received 250 units at $50.00 per unit.

12/12/2015 – Issued 400 units.

12/20/2016 – Received 300 units at 58.00 per unit.

12/25/2015 – Issued 200 units.

12/30/2015 – Issued 200 units.

SOLUTION TO THE LIFO QUESTION

As the name implies (Last In First Out), you will issue out the last stock receipt first. The last batch of stock was received on 20th December.

So for the first batch of stock issue take the last stock receipt which was 300 units at $58 per unit (300 * $50 = $17400).

To complete the quantity for the first issue to 400 unit, deduct 100 units from the 10th December 250 units at $30 per unit receipt stock (100 * $30 = $3000).

Adding the two amount will give you a total of $20400 as shown below.

Follow this pattern when issuing out the subsequent stocks. But remember that

the receipt stock on 10th December remains 150 units. So when issuing out the second batch, you will first take it.

Prepare your stock control/store ledger account LIFO Method in MS Excel in 3 sections which include: RECEIPTS, ISSUES and BALANCE as shown below.

	A	B	C	D	E	F	G	H	I	J
1	VEGAN FAST FOOD									
2	STORE LEDGER ACCOUNT AS AT DECEMBER 2015									
3	MATERIAL CODE: MB/001 METHOD: LIFO									
4		RECEIPTS			ISSUES			BALANCE		
5	DATE	QTY	PRICE ($)	AMOUNT	QTY	COST ($)	AMOUNT ($)	QTY	PRICE ($)	AMOUNT ($)
6	12/1/2015							100	30	3000
7	12/5/2015	200	30	6000				300		9000
8	12/10/2015	250	50	12500				550		22400
9	12/12/2015				400	51	20400	150		2000
10	12/20/2015	300	58	17400				450		19400
11	12/25/2015				200	45	9000	250		10400
12	12/30/2015				200	32.25	6450	50	70	3950

The opening stock for January 2016 was 50 units at $79.00 per unit.

SIMPLE AVERAGE METHOD (SAM)

In this method, the price used to issue out goods is gotten by first summing the different receipt prices of the materials and then diving the total price by the number of receipt price used. It is on an average price of the batch irrespective of the quantity involved.

MERITS OF SIMPLE AVERAGE METHOD (SAM)

1. It is easy to operate
2. Fluctuation in price can be ironed out using this method

DEMERITS OF SIMPLE AVERAGE METHOD (SAM)

1. Average may be misleading and distortion in prices of some goods may occur.
2. During inflation, this method will give prices that are closer to later prices which are likely to be higher. Therefore, stocks and profits tend to be overstated.

PRACTICAL/BUSINESS ILLUSTRATION OF SIMPLE AVERAGE METHOD (SAM)

Let me give you another practical illustration of store ledger account with simple average method.

PRACTICAL QUESTION ON SIMPLE AVERAGE METHOD:

Using the information provided below for Star Fast food for the month of January 2017, prepare a store ledger account using the Simple Average Method (SAM) of pricing material goods.

Information:

01/01/2017 – Opening balance: 100 units at $39.00 per unit.

01/05/2017 – Received 200 units at $30 .00 per unit.

01/10/2017 – Received 250 units at $50.00 per unit.

01/12/2017 – Issued 400 units.

01/20/2017 – Received 300 units at 58.00 per unit.

01/25/2017 – Issued 200 units.

01/30/2017 – Issued 200 units.

SOLUTION TO THE SAM QUESTION

The Simple Average Method (SAM) uses the approach of FIFO (First In First Out). Therefore for the first issue on 12th January, which was 400 units, you first take the opening stock which was 100 units at $39 per unit.

Next, you take the first stock receipt on 5th January which was 200 units at $30 per unit.

To complete the first issue unit to 400 units, you deduct 100 units from the second stock receipt on 10th January which was 250 units at $50. So the first issue will now sum up to 400 units.

Next, you add the various prices together ($39 + $30 + $50 = $119). Since you used three different prices, you divide total of the three used prices by 3 ($119 / 3 = $39.6667). It will give you $39.6667. This price is the price you will use

to issue out the 400 units of goods.

Remember that the 250 units stock on 10th January has a balance of 150 units. So you have to make use of it first when issuing out the second batch of goods.

Prepare your store ledger account for Simple Average Method in Microsoft Excel in 3 sections which include: RECEIPTS, ISSUES and BALANCE as shown in the Excel worksheet below.

	A	B	C	D	E	F	G	H	I	J
1	STAR FAST FOOD									
2	STORE LEDGER ACCOUNT AS AT JANUARY 2017									
3	MATERIAL CODE: MB/001 METHOD: SAM									
4		RECEIPTS			ISSUES			BALANCE		
5	DATE	QTY	PRICE ($)	AMOUNT ($)	QTY	COST ($)	AMOUNT ($)	QTY	PRICE ($)	AMOUNT ($)
6	1/1/2017							100	39	3900
7	1/5/2017	200	30	6000				300		9900
8	1/10/2017	250	50	12500				550		22400
9	1/12/2017				400	39.5667	15866.68	150		6533.32
10	1/20/2017	300	58	17400				450		23933.32
11	1/25/2017				200	54	10800	250		13133.32
12	1/30/2017				200	58	11600	50	30.6664	1533.32

The opening stock for February 2017 would be 50 units at $30.6664 per unit.

WEIGHTED AVERAGE METHOD (WAM)

Under this method, issues are prized at a weighted average price which is obtained by dividing the amount value of the stock in hand by the number of units of stock in hand. Issues will continue to be priced at that price until another batch of goods is received. Then a new weighted average price is calculated.

The implication of the Weighted Average Method (WAM) is that a new weighted average price is calculated any time a new batch of stock is received.

MERITS OF WEIGHTED AVERAGE METHOD (WAM)

1. It is not cumbersome as in FIFO and LIFO methods.
2. It presents a fair indication of stock value.
3. It evens out fluctuation in the price of material goods.

DEMERITS OF WEIGHTED AVERAGE METHOD (WAM)

1. Issued prices are usually approximated to a number of decimal places, which results to inconsistency in accounting.
2. During inflation, stock and price increase.
3. Issues of production may not reflect current economic value.

PRACTICAL/BUSINESS ILLUSTRATION OF WEIGHTED AVERAGE METHOD (WAM)

This time I will give you another practical illustration of store ledger account using weighted average method.

PRACTICAL QUESTION ON WEIGHTED AVERAGE METHOD:

Using the information provided below for Dangote Groups for the month of January 2017, prepare a store ledger account using the Weighted Average Method (WAM) of pricing material goods.

Information:

01/01/2017 – Opening balance: 100 units at $39.00 per unit.

01/05/2017 – Received 200 units at $30 .00 per unit.

01/10/2017 – Received 250 units at $50.00 per unit.

01/12/2017 – Issued 400 units.

01/20/2017 – Received 300 units at 58.00 per unit.

01/25/2017 – Issued 200 units.

01/30/2017 – Issued 200 units.

SOLUTION TO THE WAM QUESTION

The stock in hand before the first 400 units issue is 550 units (i.e. 100 units + 200 units + 250 units = 550 units). So according to this method, you divide the total amount in hand by the total number of units of stock in hand, which gives you a weighted price of $40.7273. You will now use this price to issue out the stocks until another batch of goods are received.

Prepare your store ledger account for Weighted Average Method in Microsoft Excel as shown in in the worksheet below.

	A	B	C	D	E	F	G	H	I	J
1	DANGOTE GROUPS									
2	STORE LEDGER ACCOUNT AS AT JANUARY 2017									
3	MATERIAL CODE: MB/001 METHOD: WAM									
4		RECEIPTS			ISSUES			BALANCE		
5	DATE	QTY	PRICE ($)	AMOUNT ($)	QTY	COST ($)	AMOUNT ($)	QTY	PRICE ($)	AMOUNT ($)
6	1/1/2017							100	39	3900
7	1/5/2017	200	30	6000				300		9900
8	1/10/2017	250	50	12500				550	40.7273	22400
9	1/12/2017				400	40.7273	16290.92	150	52.2424	6109.08
10	1/20/2017	300	58	17400				450	52.2424	23509.08
11	1/25/2017				200	52.2424	10448.48	250		13060.6
12	1/30/2017				200	52.2424	10448.48	50	52.2424	2612.12

The opening stock for February 2017 would be 50 units at $30.6664 per unit.

PRACTICAL EXERCISE FOR STORE LEDGER ACCOUNTING

Try to practice this exercise on your own. It will help you master store ledger accounting with MS Excel

QUESTION:

The table below shows the receipts and issues of Joe-Links Services for the month of February 2017:

1	DATE	RECEIPTS	DATE	ISSUES
2	2/2/2017	300 units @ $20	2/4/2017	500 units
3	2/5/2017	700 units @ $15	2/5/2017	745 units
4	2/7/2017	500 units @ $35	2/10/2017	425 units
5	2/14/2017	600 units @ $35	2/14/2017	500 units
6	2/22/2017	250 units @ $25	2/25/2017	410 units
7	2/26/2017	400 units @ $35	2/28/2017	200 units

As at 1st February 2017, the opening stock was 250 units at $20 per unit. Prepare a store ledger account using:

- FIFO
- LIFO
- Simple Average Method
- Weighted Average Methods of pricing material goods.

CHAPTER 5: CALCULATING DEPRECIATION IN MS EXCEL

Almost all fixed asset depreciate (with land an exception). So every business should know how to calculate the depreciation charges on their fixed assets. Depreciation can be calculated manually but a spreadsheet management software like Microsoft Excel simplifies the whole job for you.

Depreciation can be seen as the gradual or total fall in the value of a fixed asset. It can also be defined as the wear and tear of any fixed asset which results to loss of value.

In the other way, depreciation is also seen as that part of an asset consumed annually throughout the period the asset is used by the company.

Some fixed assets that depreciate include:

1. Office Equipment
2. Plant and Machinery
3. Land and Building
4. Furniture and Fittings
5. Tools, etc.

CAUSES OF DEPRECIATION

1. **USAGE:**
   Continuous use of a fixed asset results in wear and tear which leads to loss in value of the asset.
2. **PASSAGE OF TIME (DURATION):**
   Whether an asset is in use or not, its value tends to depreciate with time.
3. **OBSOLESCE (OUT DATED):**
   A fixed asset tends to depreciate if it is no longer produced or used. This type of depreciation is mainly caused by change in technology. For example, a change in the model of cars, phone, etc.
4. **PHYSICAL FACTORS:**
   Some physical factors like rain, sunshine, etc. cause damage to assets like building, plants and machinery, etc. and as a result leads to loss in value.

FACTORS TO CONSIDER BEFORE CHARGING DEPRECIATION

Before you go ahead to charge for the depreciation of your fixed assets, there are many factors you really need to consider. I will be using some of these terminologies in this chapter. So you need to get used to them now.

Some of these factors include:

1. **COST:**
   This is the amount required to procure or purchase an asset which must be greater or equal to the salvage or scrap value.
2. **SALVAGE OR SCRAP VALUE:**
   This is the worth or the amount an asset can be sold after its useful life. It is also known as the **Residual Value** of an asset.
3. **ESTIMATED USEFUL LIFE:**
   This is the length of time an asset is expected to be in use before it becomes a scrap. In other words, estimated useful life is the number of periods (which can be in days, weeks, months or years) it takes an asset to depreciate to its useful life.

METHODS OF CALCULATING DEPRECIATION

There are many different methods of calculating depreciation charges on a fixed asset, but I will only list and explain the three most common methods and also show you how to do the calculation both manually and using Microsoft Excel Spreadsheet.

These 3 major methods include:

1. Straight Line (SLN) Method.
2. Diminishing Balance (DB) Method or Double Decline Balance (DDB) Method.
3. Sum of Years Digit (SYD) Method.

STRAIGHT LINE (SLN) METHOD:

In this method, a specific amount of money is charged year after year as the asset depreciates over its useful life.

For the manual calculation, the syntax or formula is:

(Cost – Scrap Value)/Useful Life

The MS Excel Syntax is:

=SLN(Cost, Salvage, Life) then press the enter key

Where:

Cost is the amount you bought the asset.

Salvage or Scrap Value is the worth of the asset after its useful life.

Life or Useful Life is the time that the asset takes to attain its scrap value.

PRACTICAL ILLUSTRATION OF THE STRAIGHT LINE METHOD

Now, let me show you a practical example of how to calculate the depreciation of an asset using the Straight Line Method.

QUESTION:

An Android phone was bought for $20000 with 5 years useful life after which

it becomes a scrap with $5000 value. Calculate the annual depreciation charge using the straight line method.

SOLUTION:

SOLVING MANUALLY;

Cost = $20000

Salvage value = $5000

Useful life = 5 years

Therefore **Annual Depreciation Charge = (Cost – Scrap Value)/Useful Life**

= ($20000 - $5000) / 5 = ($15000) / 5 = **$3000**

This means that an annual depreciation charge of $3000 will be charged on the asset for 5 years.

USING MICROSOFT EXCEL;

Prepare your worksheet as shown below.

	A	B
1	Cost	20000
2	Salvage	5000
3	Life	5
4	Annual Depreciation	$3,000.00

Then type this formula into cell B4:

=SLN(B1, B2, B3) then press the enter key.

Excel returns $3000 in cell B4.

NOTE:

You should get the same answer you got when you solve it manually, which

DOUBLE DECLINE BALANCE (DDB) METHOD:

Under this method, a specific percentage is charged to the balance of the asset as the asset depreciates. This means that the depreciation charge on the asset will be higher in the early age of the asset than on its later age.

For the manual calculation, the syntax or formula is:

(Rate * Cost)/(Useful Life * 100)

The MS Excel Syntax is:

=DDB(Cost, Salvage, Life, Period, Factor) then press the enter key

Where:

Cost is the amount you bought the asset.

Salvage or Scrap Value is the worth of the asset after its useful life.

Life or Useful Life is the time that the asset takes to attain its scrap value.

Period is the age of the asset.

Rate or **Factor** is the Depreciation rate of the asset usually expressed in percentage.

PRACTICAL ILLUSTRATION OF THE DOUBLE DECLINE BALANCE (DDB) METHOD

This time, I will show you a practical example of how to calculate the depreciation of an asset using the Double Decline Balance Method.

QUESTION:

Philips Bakery bought an asset of $200000 with 6 years useful life after which it becomes a scrap. Calculate the depreciation charge for the period of 4 years assuming 25% was given as the depreciation charge using the DDB method

SOLUTION:

SOLVING MANUALLY;

Cost = $200000

Useful life = 6 years

Rate = 25%

The depreciation charges for the four years are calculated as follows using the above given formula and substituting values directly:

Depreciation Charge for the 1st Year

= (25 * 200000) / (6 * 100) = **$8333.33**

Worth of Asset at the beginning of the 2nd Year

= (200000 – 8333.33) = **$191666.67**

Depreciation Charge for the 2nd Year

= (25 * 191666.67) / (6 * 100) = **$7986.11**

Worth of Asset at the beginning of the 3rd Year

= (191666.67 – 7986.11) = **$183680.56**

Depreciation Charge for the 3rd Year

= (25 * 183680.56) / (6 * 100) = **$7653.36**

Worth of Asset at the beginning of the 4th Year

= (183680.56 – 7653.36) = **$176027.20**

Depreciation Charge for the 4th Year

= (25 * 176027.20) / (6 * 100) = **$7334.47**

Worth of Asset at the end of the 4th Year

= (176027.20 – 7334.47) = **$168692.73**

CALCULATION TIPS:

Current Worth or Value = Previous Worth - Previous Depreciation Charge

Therefore the annual depreciation charge for the 1st, 2nd, 3rd and 4th year are:

$8333.33, $7986.11, $7653.36 and $7334.47 respectively

USING MICROSOFT EXCEL;

Prepare your worksheet and enter the data as shown below.

	A	B	C	D	E
1		YEAR 1	YEAR 2	YEAR 3	YEAR 4
2	Cost, Value or Worth ($)	200000			
3	Salvage ($)				
4	Life (years)	6	6	6	6
5	Period	1	2	3	4
6	Rate or Factor	25%	25%	25%	25%
7	Depreciation Charge				

Place your cell pointer in the following specified cells and type the following syntaxes:

For the Subsequent Worth:

In cell C2: **=B2 – B7**

In cell D2: **=C2 – C7**

In cell E2: **=D2 – D7**

For the Depreciation Charges:

In cell B7: **=DDB(B2, 0, B4, B5, B6)**

In cell C7: **=DDB(C2, 0, C4, C5, C6)**

In cell D7: **=DDB(D2, 0, D4, D5, D6)**

In cell E7: **=DDB(E2, 0, E4, E5, E6)**

If you got everything correctly, your worksheet should now look like the one shown below.

	A	B	C	D	E
1		YEAR 1	YEAR 2	YEAR 3	YEAR 4
2	Cost, Value or Worth ($)	200000	191666.6667	184013.31	176971.71
3	Salvage ($)				
4	Life (years)	6	6	6	6
5	Period	1	2	3	4
6	Rate or Factor	25%	25%	25%	25%
7	Depreciation Charge	$8,333.33	$7,653.36	$7,041.60	$6,489.97

NOTES:

Excel may display an error message, check the error code and make the necessary corrections, revise **Chapter 1** where I explained MS Excel error

messages and their solutions in detail now.

The depreciation charge values for the 4 years using MS Excel DDB syntax are slightly different from the values gotten when manually. The difference results from the approximation you make when solving it manually. When solving in real life challenges, avoid approximating values. Use the values exactly as given by your calculator.

SUM OF YEARS DIGITS METHOD

This method states that an asset contributes more to the profit of a company or business organization when it is new than when it is old. Therefore, a higher depreciation charge should be charged at the early stage of the asset. The Sum of Years Digits Method is very similar to the Double Decline Balance Method.

For the manual calculation, the syntax or formula is:

(Year of Calculation / Sum of Years Digits) * (Cost – Salvage Value)

Where:

Sum of Years Digits is calculated with this formula:

$(n^2 + n) /2$

Where **n** = Useful life of the asset.

Year of Calculation is the particular year you want to find its depreciation charge value.

Cost is the amount you bought the asset.

Salvage or Scrap Value is the worth of the asset after its useful life.

Life or Useful Life is the time that the asset takes to attain its scrap value.

NOTES:
If there is residual or salvage value, you must deduct it from the cost of the assets so that you get the **Actual Cost** which is **Cost – Salvage Value**.

So the manual formula for SYD method could be re-written as:

(Year of Calculation / Sum of Years Digits) * Actual Cost

The MS Excel Syntax is:

=SYD(Cost, Salvage, Life, Period) then press the enter key

PRACTICAL ILLUSTRATION OF THE SUM OF YEARS DIGITS METHOD

For the Sum of Years Digits method, I will show you a more practical example of how to calculate the depreciation of an asset using both the manual formula and MS Excel Syntax.

QUESTION:

An asset was bought for $1000 with 5 years useful life and a scrap value of $100. Compute its depreciation schedule using the Sum of Years Digits (SYD) method.

SOLUTION:

SOLVING MANUALLY;

Cost = $20000

Salvage value = $5000

Useful life (n) = 5 years

Actual Cost = Cost – Salvage = $1000 - $100 = $900

Sum of Years Digits = $(n^2 - n) / 2 = (5^2 - 5) / 2 = 15$

OR

5 + 4 + 3 + 2 + 1 = 15

The depreciation charges for the five years of useful life are calculated as follows using the above given formula and substituting values directly:

Depreciation Charge for the 1st Year

= (5 / 15) * (900) = **$300**

Depreciation Charge for the 2nd Year

= (4 / 15) * (900) = **$240**

Depreciation Charge for the 3rd Year

= (3 / 15) * (900) = **$180**

Depreciation Charge for the 4th Year

= (2 / 15) * (900) = **$120**

Depreciation Charge for the 4th Year

= (1 / 15) * (900) = **$60**

NOTES:

If you calculated the value correctly, you should get back the salvage after deducting the depreciation charges from the **Cost**

i.e. $1000 – ($300 + $240 + $180 + $120 + $60) = $1000 - $900 = $100 = **Salvage Value**

USING MICROSOFT EXCEL;

Prepare your worksheet and enter the data as shown below.

	A	B	C	D	E	F
1		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
2	Cost, Value or Worth ($)	1000	1000	1000	1000	1000
3	Salvage ($)	100	100	100	100	100
4	Life (years)	5	5	5	5	5
5	Period	1	2	3	4	5
6	Depreciation Charge					

Place your cell pointer in the following specified cells and type the following syntaxes:

For the Depreciation Charges:

In cell B6: **=SYD(B2, B3, B4, B5)**

In cell C6: **=SYD(C2, C3, C4, C5)**

In cell D6: **=SYD(D2, D3, D4, D5)**

In cell E6: **=SYD(E2, E3, E4, E5)**

In cell F6: **=SYD(F2, F3, F4, F5)**

If you got everything correctly, your worksheet should now look like the one shown below.

A	B	C	D	E	F
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Cost, Value or Worth ($)	1000	1000	1000	1000	1000
Salvage ($)	100	100	100	100	100
Life (years)	5	5	5	5	5
Period	1	2	3	4	5
Depreciation Charge	$300.00	$240.00	$180.00	$120.00	$60.00

NOTES:

Excel may display an error message, check the error code and make the necessary corrections, revise **Chapter 1** where I explained MS Excel error messages and their solutions in detail now.

The answer you got when you used the manual method should match with the ones you got using the MS Excel SYD syntax because there was no approximation.

Let me now test your knowledge.

PRACTICAL EXERCISES ON DEPRECIATION

Please try to do these practical exercises on your own. It will go a long way to help you.

1. What are the causes of depreciation?
2. State 3 reasons why a provision for depreciation is charged on a fixed asset.
3. Johnson Enterprise purchased a delivery van for $50000. The van has an estimated useful life of 8 years with nil scrap value. Calculate the annual depreciation charge using the Straight Line Method.
4. Joe-Links Services bought an asset at a cost of $20000. Other expenses incurred in the charge and installation amounted to $5000. The company depreciates its assets at the rate of 20%. On cost per annual on a straight line basis, calculate he depreciation charge.
5. Joe-Links Services purchased some equipment for $10000 with 5 years useful life after which it becomes a scrap. Calculate the depreciation charges for the period of 4 years assuming 20% was given as depreciation rate using the Double Decline Balance (DDB) Method.
6. An asset was bought for $20000 with useful life of 5 years and a salvage value of $1000. Compute its depreciation charge using Sum of years Digits (SYD) Method.
7. Mr. Wilson bought a set of computers at a price of $250000 each with a scrap value of $15000 after 3 years of usage. Prepare a depreciation table to calculate the reduction in value of the computers in straight line basis with variable periods (in years) 4, 5, 6, 7 and 8 and a scrap values of $5000, $7000, $10000, $13000and $15000 respectively.

CHAPTER 6: WHAT IF ANALYSIS TOOLS AND PMT FUNCTION

PMT FUNCTION

The PMT function is one of the MS Excel's built in function used to compute the periodic amount that will be used to pay off a loan either on daily, weekly, monthly or yearly basis. The PMT function is used in Loan Amortization analysis and helps to know the total amount you have to pay back when you borrow a loan from any financial institution. The PMT function syntax is:

=PMT(Rate, NPer, PV, FV, Type) then press the Enter Key

The PMT function takes five argument of which the last two are optional.

Where:

Rate is the percentage interest charged on the principal or amount you borrowed,

NPer is the number of period or duration of the loan,

PV is the present value, that is the principal amount you planned to borrow,

FV is the future value and it is optional likewise the **Type** argument.

LOAN AMORTIZATION OR PAYMENT

WHAT IS LOAN AMORTIZATION?

Loan Amortization is the act of paying a certain amount of money regularly in order to offset a loan over a period of time (daily, weekly, monthly or yearly basis). The PMT function is used to calculate the exact amount of money to be paid regularly in order to amortize or pay back a loan including the interest and other accrued charges within that period. You can also adjust the PMT function to suite your payment interval which can be daily, weekly, monthly or even yearly.

For example, to calculate the monthly payment that will amortize a 25 years mortgage of $500000 with an interest of 21%:

LOAN AMORTIZATION CALCULATION STEPS

You will first determine the monthly interest by dividing the 21% interest rate by 12 (21 / 12) which is the number of months in a year. It will you a monthly rate of 1.75%.

Next step is to convert the number of periods into months by multiplying the 25 years by 12. It gives you 300 months.

Finally, you input the values into the PMT function as follows:

PMT(1.75%, 300, 500000) then press the Enter key.

It returns a value of **$8798.31**. This means that you will be paying $8798.31 at the end of every month for 300 months (25 years).

Using Microsoft Excel, you can arrange the data in a worksheet and then further calculate the **Total pay** and **Bank profit**. Enter the data as seen in the excel worksheet shown below.

	A	B
1	Loan Amount ($)	500000
2	Interest Rate	21%
3	Period (in months)	300
4	Monthly pay	
5	Total pay	
6	Bank profit	

Enter the following formulas in the appropriate cells as specified below:

For the Monthly pay; in cell B4, type: **=PMT(B2/12, B3, B1)** then press the Enter key.

For the Total pay; in cell B5, type: **=B4*B3** then press the Enter key.

For Bank profit; in cell B6, type: **=B5-B1** then press the Enter key.

Your worksheet should now look like the one shown below.

A	B
Loan Amount ($)	500000
Interest Rate	21%
Period (in months)	300
Monthly pay	($8,798.31)
Total pay	($2,639,494.24)
Bank profit	($3,139,494.24)

I did not provide values for the last two arguments in the PMT function formula. The values are not necessarily needed in this example and also they are optional arguments.

WHAT-IF ANALYSIS AND ITS TOOLS

What-if analysis is one of the most important benefits of Microsoft Excel as a spreadsheet application. Performing what if analysis means changing the values of certain key variables in a formula or worksheet. It can be performed using some of MS Excel's powerful tools such as Scenario Manager, Goal Seek and Data Tables.

SCENARIO MANAGER

Scenarios Manager is one of MS Excel's powerful what-if tools used to substitute values automatically in a worksheet. It is used to calculate loan amortization on what if basis. An example of a logical question that Scenario Manager that Scenarios answer are:

If I decide to pay back a 12 year $1000000 loan within 10 years on monthly basis, what then will be my monthly pay to amortize the loan and what will be my total payback amount?

FUNCTIONS OF SCENARIOS

1. It is used in loan amortization analysis.
2. Scenario Manager is used to adjust values automatically in a worksheet.
3. It is used to substitute values such as Loan amount, Interest rate and Period automatically.
4. Scenario is used to summarize loan amortization.
5. It enables the user to calculate the monthly pay, total pay and bank profit at the end of each period.

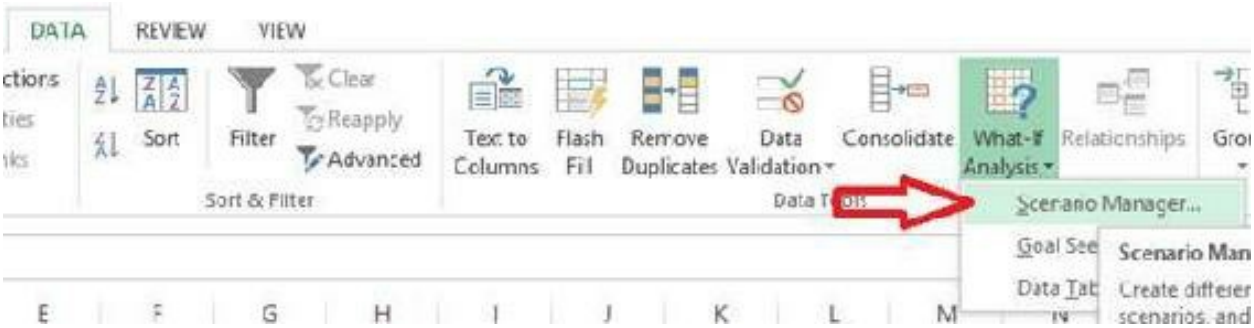
GENERAL STEPS TO CREATE A SCENARIO SUMMARY IN MS EXCEL

Now, I will give you the step by step guide to create a summary for loan amortization or payment using the scenario manager in Microsoft Excel. I will also illustrate it further with a practical example.

To Create a Scenario Summary for Loan Payment in MS Excel:

1. Prepare the loan amortization table and calculate the monthly pay, total pay and bank profit using the PMT function as illustrated above.

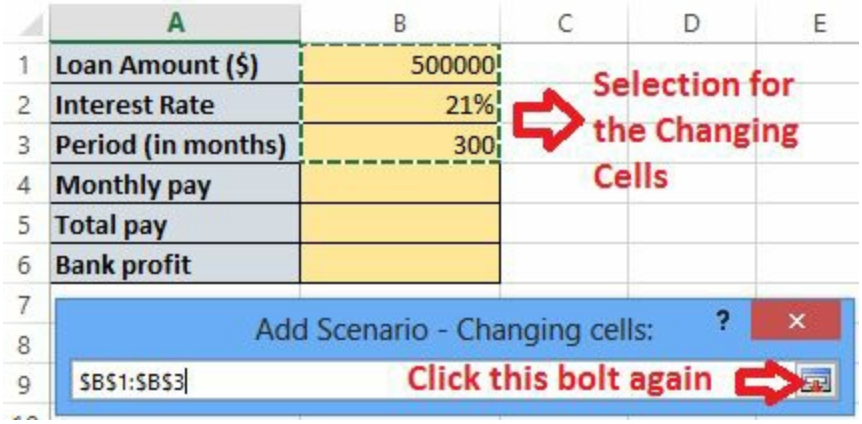
2. Click the **Data** tab, then click the **What-if Analysis** drop down arrow located in the **Data tools** group. Then Select **Scenario Manager** from the resulting options as shown below.



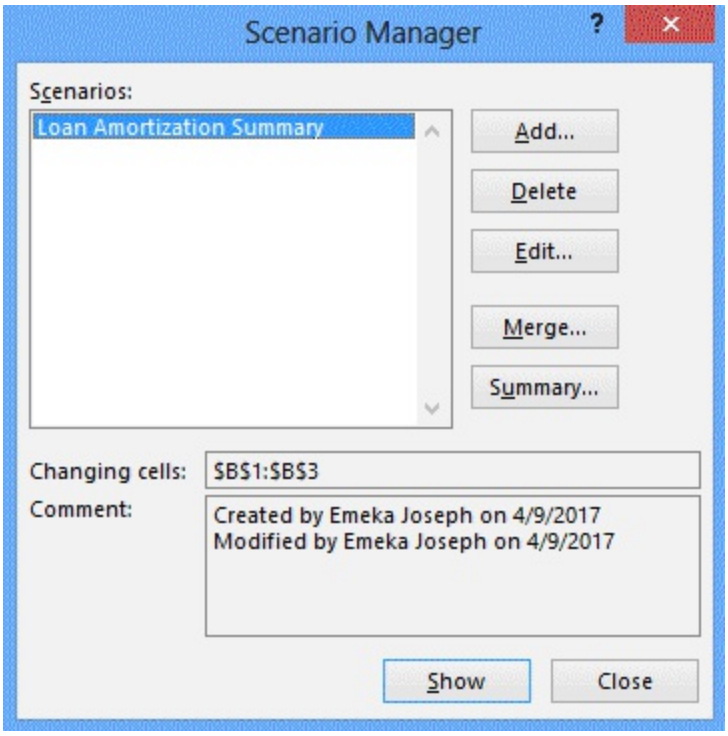
3. This prompts the **Scenario Manager** dialogue box. Click **Add** and then type in the scenario name or year.
4. Specify the **Changing cell** that is the **loan amount**, **interest rate**, and **period** and click OK.

NOTE:

You either type the cell references of the changing cell or click bolt icon at the extreme right to make a selection and then click on the bolt icon again to commit your selection as shown below.



5. Next, enter a value for each of the changing cells and click **Add**.
6. Repeat steps 3 to 5 for other set of values given. You can always add, edit, delete or merge any set of value by selecting the appropriate action button as shown below.



7. Click **Summary** and specify the **Result** cells that is the monthly pay, total pay and bank profit
8. Click OK.

DATA TABLES FOR WHAT IF ANALYSIS

Data tables help you to see results of multiple inputs such as scenario inputs at the same time. It is used to compare different data set output in MS Excel and for scenario summary.

TYPES OF MS EXCEL DATA TABLES

There are two types of data tables that can be used for what-if analysis. They include:

1. One Variable Data table
2. More than One Variable Data table

ONE VARIABLE DATA TABLE WITH ILLUSTRATION

This type of data table is constructed when dealing with only one key variable. The key variable in this case can either be the interest rate or the periods of payment.

For example, to compute the monthly payment, total payment and bank profit on a 20 year $1000000 mortgage with five different interest rates: 15%, 16%, 17%, 18% and 19%, you will first prepare a worksheet as shown below.

	A	B
1	ONE VARIABLE DATA TABLE	
2	Loan Amount ($)	1000000
3	Interest Rate	15%
4	Period (in years)	20
5	Monthly pay	
6	Total pay	
7	Bank profit	

Enter the following formulas in the appropriate cells as specified below:

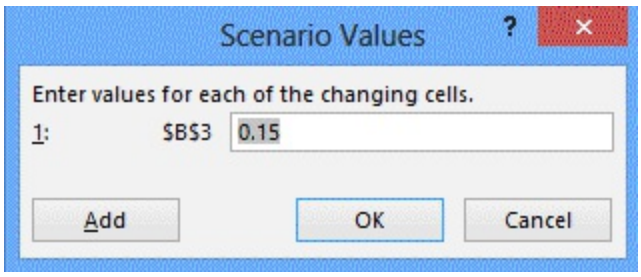
For the Monthly pay; in cell B5, type: **=PMT(B3/12, B4*12, B2)** then press the Enter key.

For the Total pay; in cell B6, type: **=B5*B4*12** then press the Enter key.

For Bank profit; in cell B7, type: **=B6-B2** then press the Enter key.

To Prepare the Scenario Summary for the above example:

1. Click the **Data** tab, then click the **What-if Analysis** drop down arrow located in the **Data tools** group. Then Select **Scenario Manager** from the resulting options.
2. This prompts the **Scenario Manager** dialogue box. Click **Add** and then type in the scenario name or year. For example First interest, Second interest, Third interest, Fourth interest, First interest, etc.
3. Specify the **Changing** cell reference, in this case, **interest rate** cell ($B$3) and click OK.
4. Next, enter a value for each of the changing cells. In this case, **15%** or **0.15** and click **Add** to add the values for the subsequent key variable as shown below.



5. Repeat steps 2 to 4 for other set of values given, that is for 16%, 17%, 18% and 19% respectively.
6. Click on **Summary** and select **Scenario Summary**. Then specify the **Results** cells range, which is **$B$5:$B$7**. Then click OK.

Your Scenario summary should resemble the one shown in the worksheet below.

Scenario Summary						
	Current Values:	First Interest	Second Interest	Third Interest	Fourth Interest	Fifth Interest
Changing Cells:						
$B$3	15%	15%	16%	17%	18%	19%
Result Cells:						
$B$5	($13,167.90)	($13,167.90)	($13,912.56)	($14,668.01)	($15,433.12)	($16,206.85)
$B$6	($3,160,295.00)	($3,160,295.00)	($3,339,014.26)	($3,520,321.32)	($3,703,947.66)	($3,889,643.65)
$D$7	($4,160,295.00)	($4,160,295.00)	($4,339,014.26)	($4,520,321.32)	($4,703,947.56)	($4,889,643.65)

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

MORE THAN ONE VARIABLE DATA TABLE WITH ILLUSTRATION

This type of data table is constructed when dealing with more than one key variable. The key variable can be all or any two of the following: Loan amount, Interest rate and Period of payment.

For example, Mr. Johnson is going for a loan of $250000 from Diamond Bank to complete his house, the bank agreed to give him the loan on an interest rate of 5% for a period of 4 years. If the bank Manager decided to offer him $300000, $350000, $400000 and $450000 loan on an interest rate of 5.5%, 6%, 6.5% and 7% respectively, what will be his weekly pay, monthly pay, total pay and bank profit on the weekly payment basis? Generate a scenario summary for the above data.

THE MORE THAN ONE VARIABLE DATA TABLE SOLUTION

First, prepare your worksheet as shown below.

	A	B
1	MORE THAN ONE VARIABLE DATA TABLE	
2	Loan Amount ($)	250000
3	Interest Rate	5%
4	Period (in years)	4
5	Weekly pay	
6	Monthly pay	
7	Total pay (weekly basis)	
8	Bank profit (weekly basis)	

Enter the following formulas in the appropriate cells as specified below:

For the Monthly pay; in cell B5, type: **=PMT(B3/52, B4*52, B2)** then press the Enter key.

For the Monthly pay; in cell B5, type: **=PMT(B3/12, B4*12, B2)** then press the Enter key.

For the Total pay (weekly basis); in cell B6, type: **=B5*B4*52** then press the Enter key.

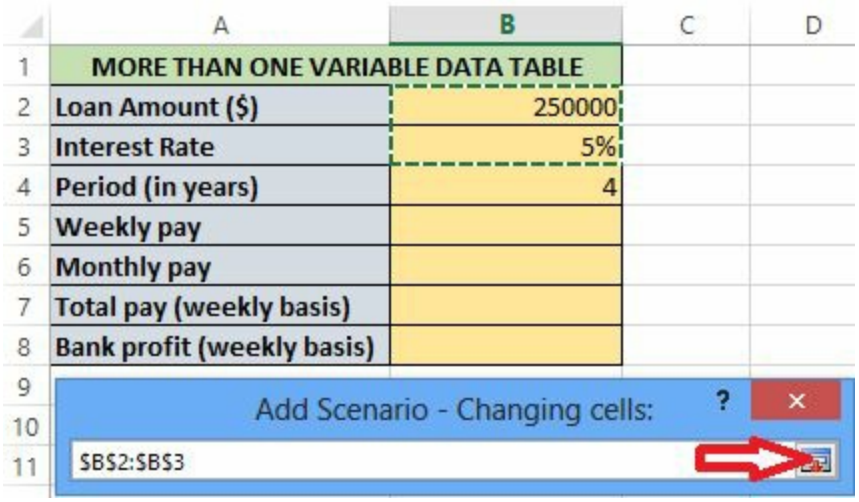
For Bank profit (weekly basis); in cell B7, type: **=B7-B2** then press the Enter key.

NOTE:

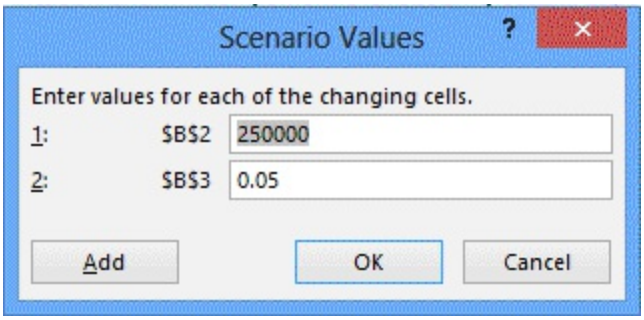
In the above Total pay (weekly basis) and Bank profit (weekly basis) formula, I multiplied the period by 52 and divided the interest rate by 52 because 52 weeks make one year.

To Prepare the Scenario Summary for the above example:

1. Click the **Data** tab, then click the **What-if Analysis** drop down arrow located in the **Data tools** group. Then Select **Scenario Manager** from the resulting options.
2. This prompts the **Scenario Manager** dialogue box. Click **Add** and then type in the scenario name or year. For example 1, 2, 3, 4, 5, etc.
3. Specify the **Changing** cells range, in this case, the **Loan Amount** cell and the **Interest rate** cell (cell range = $B$2:$B$3) as shown below and click OK.



4. Next, enter a value for each of the changing cells. In this case, the first key variable pair which is **5%** or **0.05** for the **Interest rate** cell and **$250000** for the **Loan amount** cell as shown below. Then click **Add** to add the values for the subsequent key variable pairs.



5. Repeat steps 2 to 4 for other key variable pairs given, that is $300000, $350000, $400000 and $450000 for the **Loan amount** and 5.5%, 6%, 6.5% and 7% for the **Interest rate** respectively.
6. Click on **Summary** and select **Scenario Summary**. Then specify the **Results** cells range, which is **$B$5:$B$8**. Then click OK.

Your Scenario summary for the two variable data table should resemble the one shown in the worksheet below.

Scenario Summary						
	Current Values:	1	2	3	4	5
Changing Cells:						
$B$2	250000	250000	300000	350000	400000	450000
$B$3	5%	5%	6%	6%	65%	7%
Result Cells:						
$B$5	($1,325.69)	($1,325.69)	($1,623.13)	($1,893.65)	($5,403.21)	($2,481.91)
$B$6	($5,757.32)	($5,757.32)	($7,045.51)	($8,219.76)	($23,537.87)	($10,775.81)
$B$7	($275,952.55)	($275,952.55)	($337,610.84)	($393,879.31)	($1,124,903.37)	($516,237.01)
$B$8	($525,952.55)	($525,952.55)	($637,610.84)	($743,879.31)	($1,524,903.37)	($966,237.01)

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

GOAL SEEK

This is one of the powerful tools of MS Excel used to determine the correct value for one of the arguments of a function that yielded or returned a particular result or answer. It works on the basis of what-if analysis and can also be used to solve word problems in Mathematics.

One of the practical problems that can be solved using Goal Seek goes like this: If 720 is the answer gotten by multiplying 40 by a certain number, what must be this number or figure?

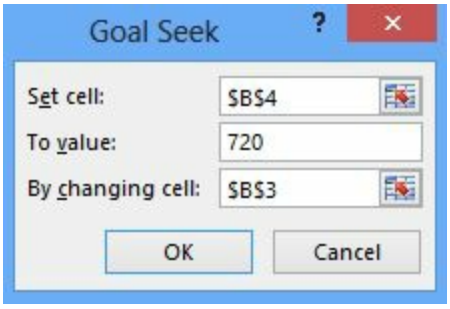
SOLUTION

1. To get the correct number using Goal Seek, prepare your worksheet like the one shown below.

	A	B
1	GOAL SEEK	
2	Known Variable	40
3	Unknown Variable	2
4	Expected Answer	

2. Type **40** which is the known or correct variable in cell B2, then type any number of your choice for the unknown or incorrect variable in cell B3. Then for the expected answer, type the following answer in cell B4: **=B2*B3** and press the Enter key.
3. Click the **Data** tab, then click the **What-if Analysis** drop down arrow located in the **Data tools** group. Then Select **Goal Seek** from the resulting options.

4. This prompts the **Goal Seek** dialogue box. Enter the values and cell references as shown below.



5. MS Excel requires you to provide three parameters or values in the 3 text boxes shown above. The required parameters are:

a. **SET CELL:** This is the cell that contains the formula that MS Excel uses for the Goal Seek analysis. In the case of the above example, the set cell is cell **B4** (the absolute cell reference is $B$4).

b. **TO VALUE:** This cell holds the desired answer. In this case your desired answer is **720**.

c. **BY CHANGING CELL:** This cell holds the cell reference of the cell containing the incorrect or unknown variable. In this case, its cell **B3** (the absolute cell reference is $B$3).

6. Click OK twice. Your worksheet should now resemble the one shown below with cell B3 now containing the correct value for the specified answer in cell B4.

	A	B
1	GOAL SEEK	
2	Known Variable	40
3	Unknown Variable	18
4	Expected Answer	720

A MORE PRACTICAL ILLUSTRATION OF GOAL SEEK

Now let me illustrate Goal Seek in MS Excel with a more practical step by step example.

QUESTION:

Joe-Links Business center made a total profit of $100000 as at December

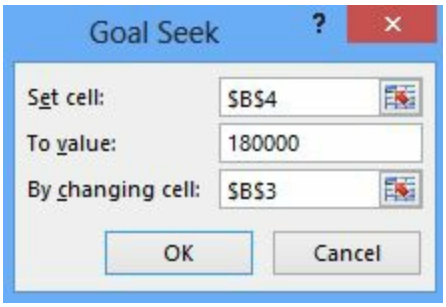
2016. The company's Manage proposed a profit of $180000 for the year 2017. Assuming they offer 50 services, at what price should they offer each of their services to meet up with the proposed income?

SOLUTION:

1. Prepare your MS Excel worksheet like the one shown below.

	A	B
1	PROPOSED INCOME FOR THE YEAR 2017 FOR JOE-LINKS BUSINESS CENTER	
2	Number of Services offered	50
3	Amount per service ($)	1
4	Expected income	

2. Type **50** in cell B2. Type in any value of your choice in cell B3 or leave it blank. Then enter the formula: **=B2*B3** in cell B4.
3. Activate the **Goal Seek** dialogue box using the procedure given in the previous example (that is **Data** tab > **What-If Analysis** (in **Data tools** panel) > Goal Seek).
4. Enter **$B$4** in the **SET CELL** text box.
5. Enter **180000** in the **TO VALUE** text box.
6. Enter **$B$3** in the **BY CHANGING CELL** text box as shown below.



NOTE:

You can also use the bolts located at the extreme right of each text box to specify the cells directly by first clicking on the bolt, specifying the cell and then clicking on the bolt again to submit the selection.

7. Click **OK** twice.

Your Excel worksheet should now look like the one shown below.

	A	B
1	PROPOSED INCOME FOR THE YEAR 2017 FOR JOE-LINKS BUSINESS CENTER	
2	Number of Services offered	50
3	Amount per service ($)	3600
4	Expected income	180000

Cell B3 contains $3600, which is the amount the company should offer each service in order to meet up with the proposed profit for the year 2017.

Now let me test your knowledge on PMT function and What-if analysis tools.

PRACTICAL EXERCISES ON WHAT-IF ANALYSIS

Please try to practice these exercises and theoretical questions on our own as it will go a long way to help you.

1. What is Amortization of loan?
2. Explain Scenario Manager as what-if analysis tool.
3. What are the functions of Scenarios?
4. Explain briefly the two types of data tables used in what if analysis.
5. Mr. Jerry is considering going for a loan of $500000 with the interest rate of 6% to be paid back within a period of 5 months. If the bank decides to offer him the following loan amounts:
   $550000, $600000, $650000 and $700000 with the interest rate of 6.5%, 7%, 7.5%, and 8% respectively to be paid back within 6 months, 7 months, 8 months and 9 months respectively, calculate his monthly payment and total payment to amortize the loans.
   Also calculate the bank's profit at the end of each period for each loan.
   Also generate a scenario summary.
6. You are the Manager of ABC Business Center and you decided to offer more services in order to increase the business profit from $90000 to $150000. Assuming you offer each service for $100, use Goal Seek to find out how many services you must offer in order to meet up with your proposal.

CHAPTER 7: ADVANCED MS EXCEL - HOW TO CREATE CUSTOM EXCEL WORKBOOK TEMPLATE

Creating or designing a custom worksheet template in MS Excel is simple and helps to save a lot of time and stress especially if you have to create different worksheet of the same format over and over again. Using this, operation, you prepare the first worksheet and save it as a template. You can create different worksheet templates for different purposes like the payroll, the Students' grade list, Sales record and report, semester GPA calculation, loan payment or amortization worksheet templates, etc. You can also select from any of MS Excel's pre-designed templates.

CREATING CUSTOM WORKBOOK AND WORKSHEET TEMPLATES IN MS EXCEL

Now, I will give you a step by step guide on how to create a custom worksheet template for any version of Microsoft Excel. Note that Excel custom templates are saved with the file extension ".xltx".

You can also create a worksheet or workbook template from some default Excel Workbook templates as you will see below. Some of the pre-designed MS Excel templates in Excel 2013 include:

Billing Statement, Blood Pressure Tracker, Expenses Report, Loan Amortization, Personal Monthly Budget, Sales Report, Time Card. But you can get more updated Excel templates at https://templates.office.com/en-us/templates-for-Excel. For all MS Office packages template, go to: https://templates.office.com/?legRedir=true&CTT=6&Origin=EC010229901033&ver=15&app=excel.exe&508f-4331-aa10-602231460ef7.

To Create a New Custom Worksheet Template in MS Excel:

1. Open a new workbook.
   For those using Excel 2007 and lower versions, you have three workbooks by default. Delete two of the default worksheet (probably **Sheet 2** and **Sheet 3**).
   For those using Excel 2013 and newer versions, you don't have to border because you have only one worksheet by default.
   To see the difference between a workbook and a worksheet, go to **chapter 1.**
2. Design the worksheet inserting the static data (data common to all the worksheet that you will create from this template).
   For example, a template for the monthly sales record will contain titles like: PRODUCT ID, PRODUCT NAME, QUANTITY BOUGHT, COST PRICE, QUANTITY SOLD, SALES PRICE, QUANTITY IN STOCK, etc.
   Leave columns that will contain dynamic data (data that will vary from worksheet to worksheet like products name, sales price, cost price, etc.) empty.

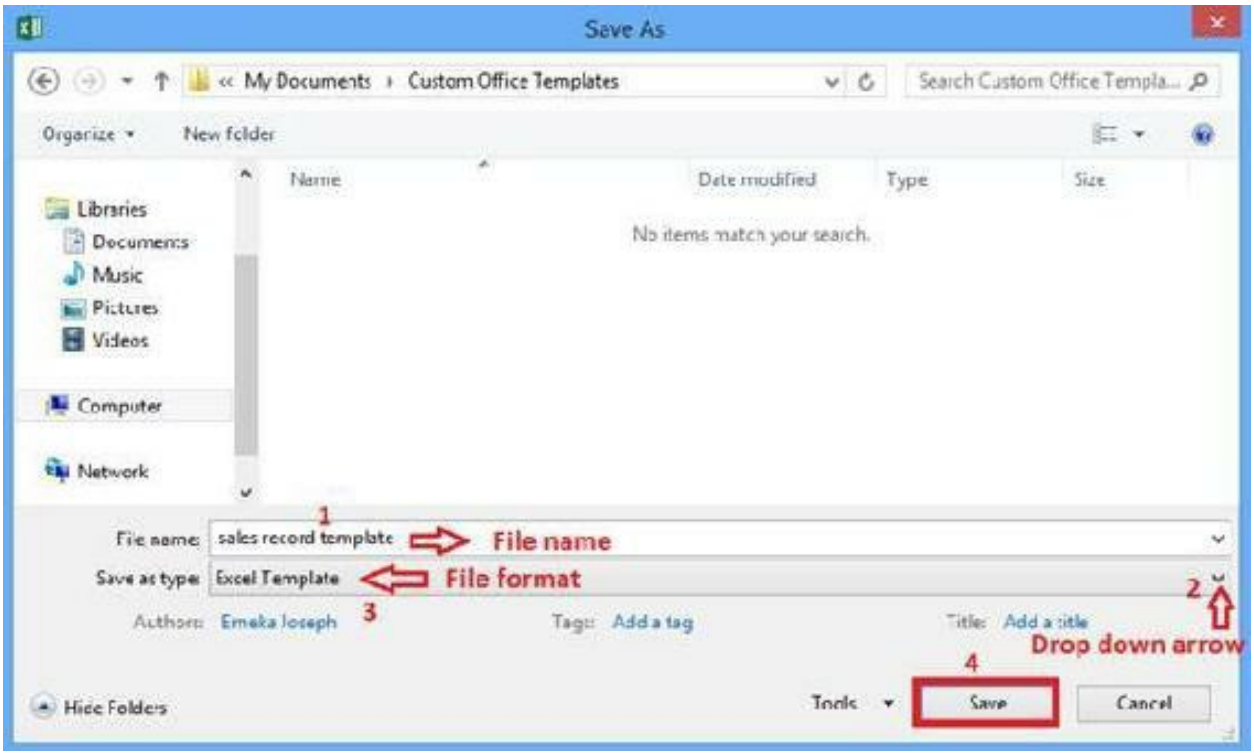
3. Insert the formulas for calculating QUANTITY SOLD in the cell formed by the intersection of the first record and the QUANTITY SOLD column using their cell references in the formula.
   For example, in the worksheet sample shown below, the QUANTITY SOLD is in column E, QUANTITY BOUGHT is in column C and QUANTITY IN STOCK is in column G of the worksheet, then the formula for calculating the QUANTITY SOLD would be: **QUANTITY BOUGHT – QUANTITY IN STOCK**. So place your cursor in cell E3 which is the intersection of column E and row 3 (the first record) and type the following formula: **=C3 – G3** then press the Enter key.

A sample of a monthly sales report is shown below.

	A	B	C	D	E	F	G
1	A SAMPLE OF A MONTHLY SALES RECORD WORKSHEET TEMPLATE						
2	PRODUCT ID	PRODUCT NAME	QUANTITY BOUGHT	COST PRICE	QUANTITY SOLD	SALES PRICE	QUANTITY IN STOCK
3	1				⇨ Cell E3		⇨ Cell G3
4	2						
5	3						
6	4						
7	5						

From the sample MS Excel worksheet template above, the static data columns are the PRODUCT ID column (A) and the dynamic data columns are the PRODUCT NAME column (B), the QUANTITY BOUGHT column (C), the COST PRICE column (D), the QUANTITY SOLD column (E), SALES PRICE column (F) and the QUANTITY IN STOCK column (G).

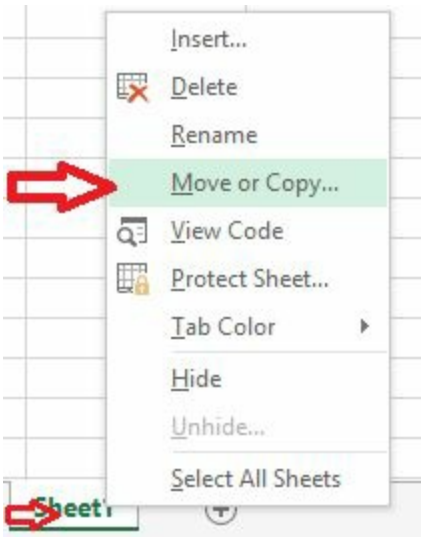
4. For the QUANTITY IN STOCK column, type the following formula in cell G3:
   =C3-E3 then press the Enter key. A circular reference warning dialogue will appear. Just click OK.
5. Click the **File** tab, then click **Save As**. Then specify the save location. This prompts the **Save As** dialogue box.
6. Type in a unique file name for the worksheet template in the **File Name** text box.
7. Click the drop down arrow at the extreme right of the **Save As Type** dropdown menu and select the **Excel Template** option from the menu option as shown below.



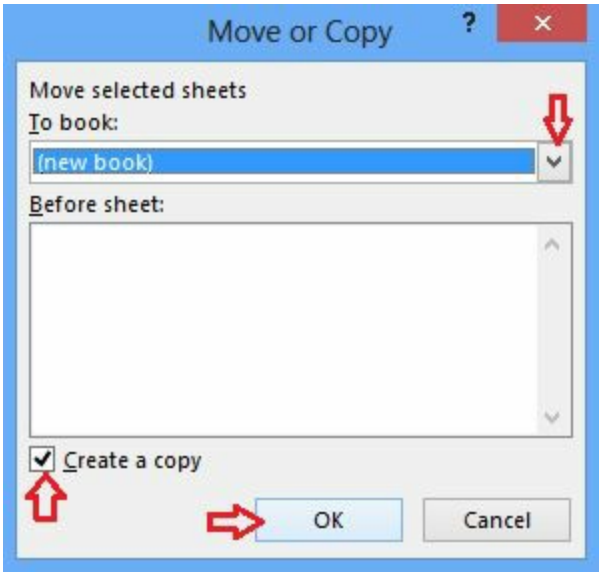
8. Click the **Save** button and the template file will be saved to a default folder called **Custom Office Templates**.

To Make Use of your Newly Created Custom Excel Worksheet Template:

1. Don't close the currently open MS Excel workbook (not worksheet), go to **chapter 1** to see the difference between Excel workbook and worksheet.
2. Right click the worksheet name at the bottom left of the window and select **Move or Copy** option as shown below.



3. This prompts the **Move or Copy** dialogue box. Click the **To book:** drop down menu and select **(new book)** from the resulting menu to create a new workbook from the previously created Excel custom template. Then check the **Create a copy** checkbox as shown below and click OK.



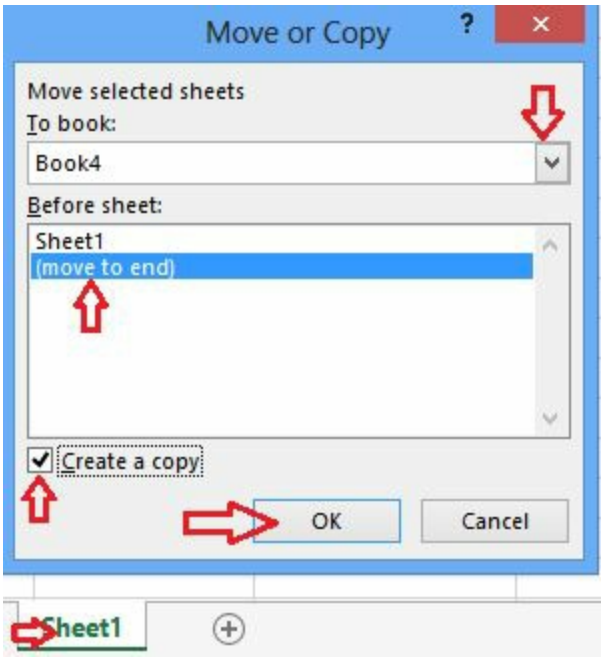
4. MS Excel automatically creates a new workbook with only one worksheet based on the previously created custom template.

To Create Another Worksheet Inside the Same Workbook Based on the Custom Template:

1. Right click sheet 1 of the newly created workbook that contains the custom template.
2. Select **Move or Copy** option. This prompts the in the **Move or Copy**

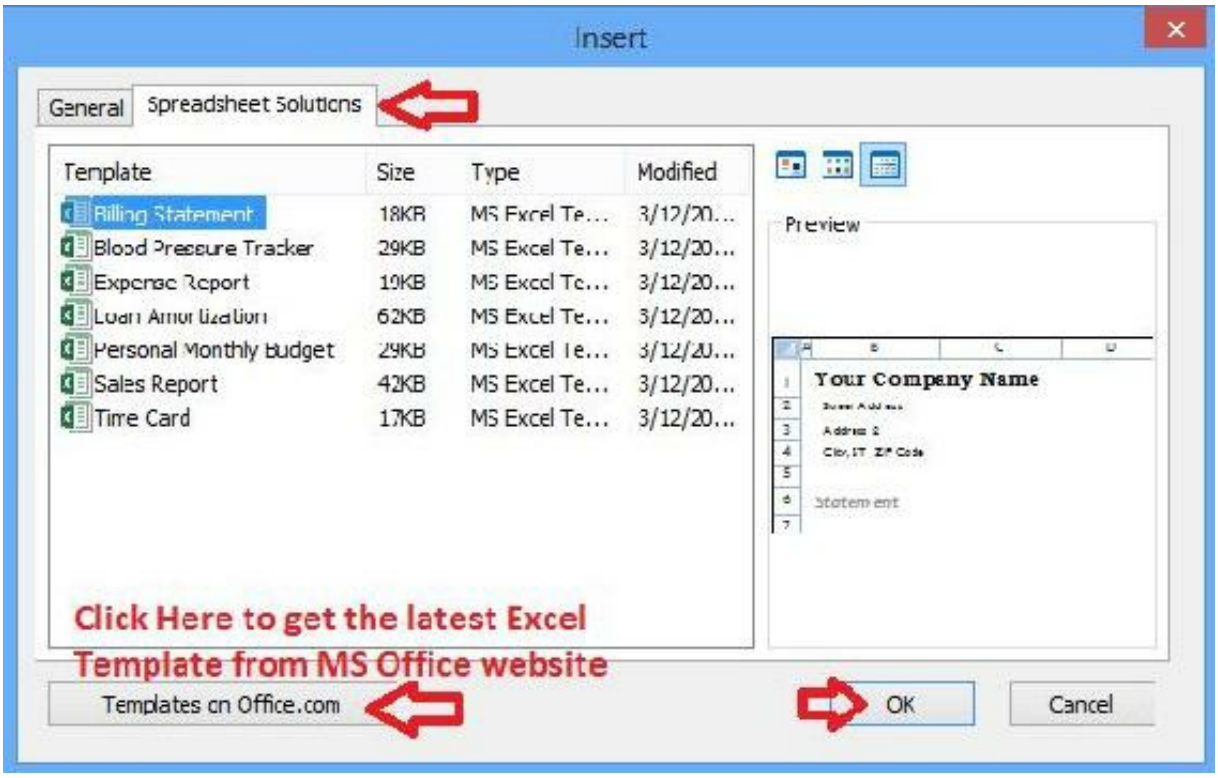
dialogue

3. Under the **To book:** drop down menu, select the name of the current workbook. Under **Before sheet:**, select **(move to end)** option. Also check the **Create a copy** check box. Then click OK as shown below.



To Create a Worksheet Based on the Default or Pre-designed MS Excel Workbook Template:

1. Create a new workbook by clicking the **File** tab > **New** > **Blank workbook**.
2. Right click **Sheet 1** at the bottom left of the workbook window and select **Insert** from the drop down menu options. This prompts the **Insert** dialogue box.
3. Select any of the MS Excel's predesigned templates under the **Spreadsheet Solutions** tab and click OK as shown below.



4. MS Excel now inserts your selected predesigned template. You now have to edit the template, deleting the unwanted parts and formulas and customizing it to your own taste.

NOTE:

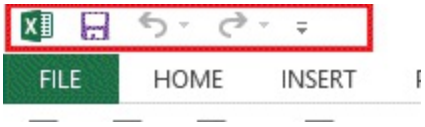
To insert another predesigned template in another new worksheet, repeat steps **2** to **4**.

HOW TO INSERT DATA INTO A WORKSHEET USING EXCEL DATA ENTRY FORM

A data entry form is just a way to quickly enter data into a cell or group of cells of a worksheet. It is mostly used when the Excel spreadsheet is too big or long for the screen. Instead of scrolling to and fro to enter data into the various columns and rows, you use a data entry form which relieves you of the scrolling stress.

For example, to insert records in a sales record worksheet for the month of January which has a column for each day of the month, you will have move to and fro, but a data form makes the data entry process faster, easier and less stressful.

The Data Forms option is normally located from the Quick Access tool bar. But by default, the Data Form is hidden and needs to be called out. When it is called out, the icon resides in the Quick Access toolbar. The Quick Access toolbar located above the tab bar as shown below.



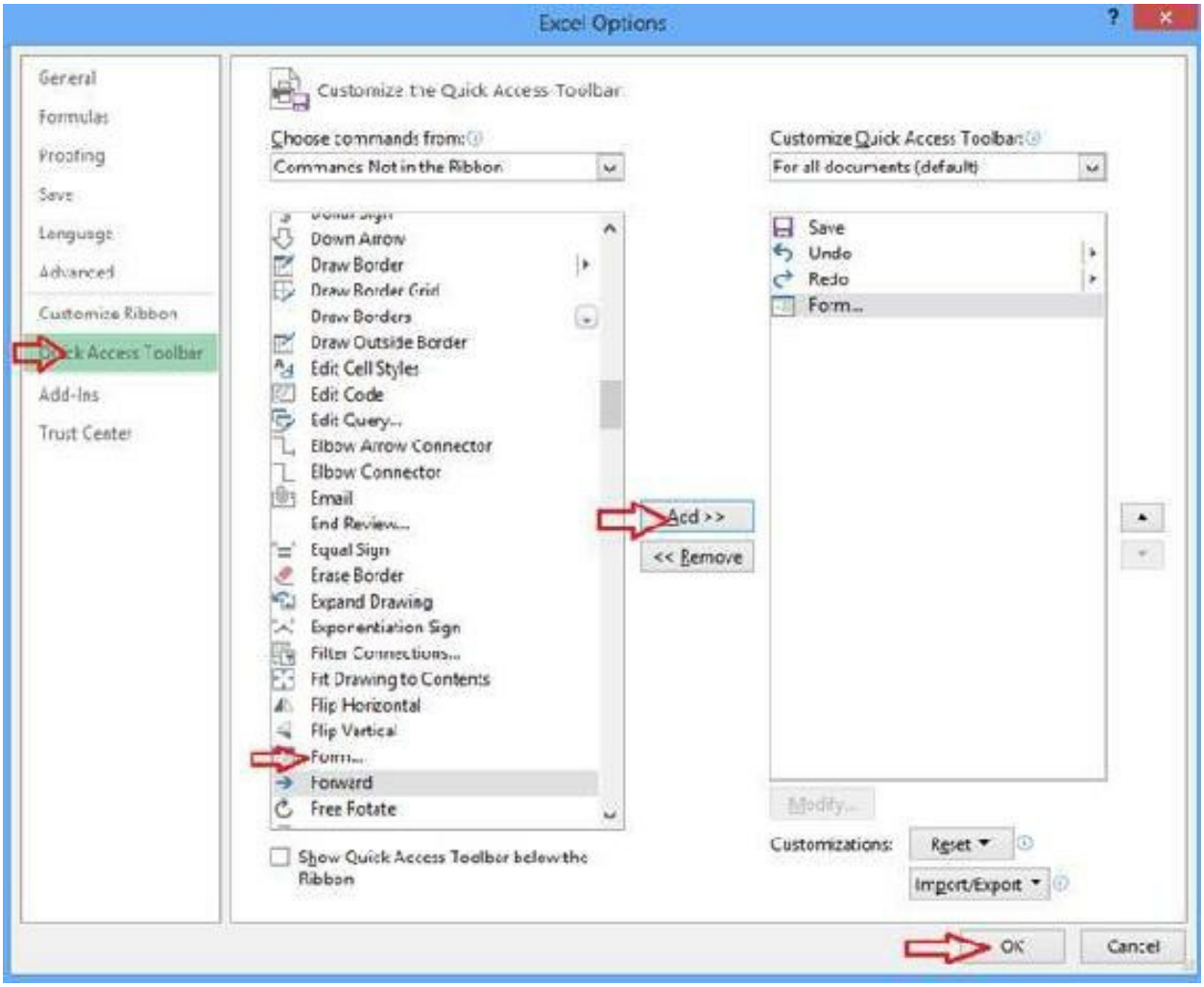
HOW TO CALL OUT THE DATA FORM ICON AND CUSTOMIZE THE QUICK ACCESS TOOL BAR IN EXCEL

Customizing the Quick Access tool bar helps you to locate and position several options and commands such as the data form command icon, which are not available in the MS Excel Quick Access tool bar and tabs by default. It also allows you to customize each tab and call out tabs like the **Developers** tab and the **Add-Ins** tab which are hidden by default. All these are available in the **Excel Option** dialogue box.

To Call Out the Data Form Icon In any Version of MS Excel:

1. If you are using MS Excel 2007 and lower versions, click the **Office** button located in the extreme top left of the Excel workbook screen. Then click **Excel Option** which is the last option in the resulting menu list. If you are using MS Excel 2010 and later versions, click the **File** menu or tab and then click **Options**. This prompts the **Excel Option**.

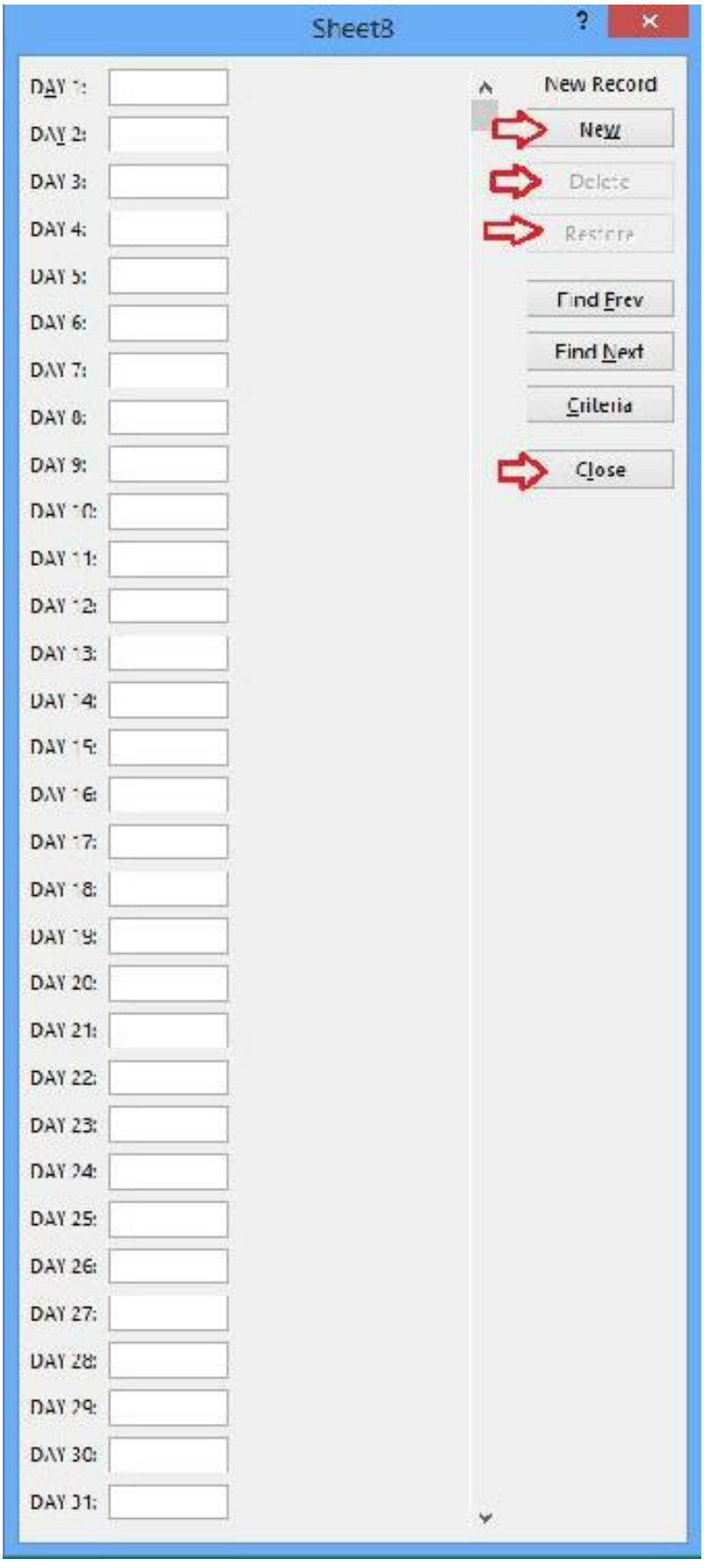
2. If you are using MS Excel 2007 and lower versions, click **Customize** located on the left menu.
   If you are using MS Excel 2010 and later version, click the **Quick Access** tool bar option on the left section of the dialogue box as shown below. The rest of the steps are the same for all versions of MS Excel.
3. To add the Data Form option to the Quick Access toolbar, click the **Choose Commands From** drop down arrow and select **Commands Not in the Ribbon** from the resulting menu options.
4. Select **Form** from the resulting option and click the **Add >>** button located in between the second and the third column of the dialogue box as shown below.



NOTE:
To add or remove any other command to or from the Quick Access toolbar,

Select the command from the **Excel Options** dialogue box and click the **Add>>** or the **Remove<<** button as the case may be.

5. Click **OK** to return to exit the dialogue box and return to your worksheet.
6. Next, type a column title for each of the days in the month of January in separate columns of the worksheet. For example, DAY 1, DAY 2, DAY3, …, DAY 31.
7. Highlight the column title row, which is normally row 1. Then click the Data Form icon you just added in the Quick Access tool bar (the last icon there). A notification dialogue box pops up asking if you would like to use the highlighted row as your column title. Click **OK**.
8. This prompts the **Data Form** dialogue box showing all the columns you highlighted.
9. Enter values for each of the column title's text box as shown below.
10. Click the **New** button to start a new row or click the **Delete** button to delete the previous row or data entered as shown below. Click the **Close** button when you are through.


Sheet8
DAY 1:
DAY 2:
DAY 3:
DAY 4:
DAY 5:
DAY 6:
DAY 7:
DAY 8:
DAY 9:
DAY 10:
DAY 11:
DAY 12:
DAY 13:
DAY 14:
DAY 15:
DAY 16:
DAY 17:
DAY 18:
DAY 19:
DAY 20:
DAY 21:
DAY 22:
DAY 23:
DAY 24:
DAY 25:
DAY 26:
DAY 27:
DAY 28:
DAY 29:
DAY 30:
DAY 31:
New Record
New
Delete
Restore
Find Prev
Find Next
Criteria
Close

So with the help of MS Excel data form, you can easily add records to a long or wide worksheet.

HOW TO CREATE A DROPDOWN MENU OR LIST FOR A WORKSHEET COLUMN IN MS EXCEL

Creating a dropdown list is very useful especially if you have to type the same data or range of values into different cells of a worksheet over and over again. It makes you type less. When you set up a dropdown menu or list for your columns, MS Excel inserts a dropdown arrow beside each cell in that column. All you have to do is to click the dropdown arrow and select one of the options in the menu.

For example, if in a sales record worksheet, the cells in the PRODUCT NAME column must contain one of the following items: keyboard, scanner, joystick, CPU and mouse, in order to save yourself from the stress retyping these items over again, you prepare a dropdown menu list for that column and then select any of the items from the menu using Excel data validation tool which allows you set some rules to limit the type of data that would be entered in a particular column or call.

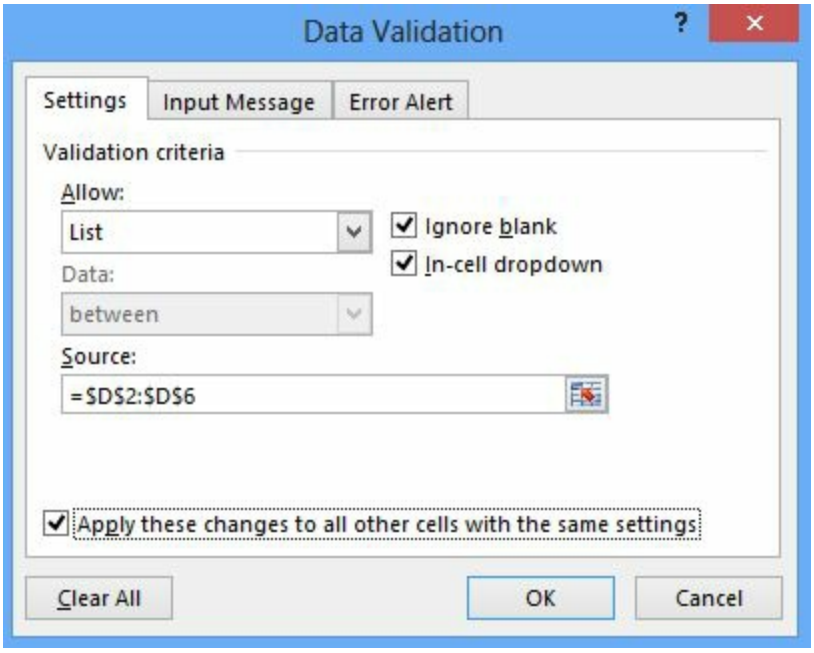
To Create a Dropdown Menu for a Column in MS Excel:

1. Prepare your worksheet like the one shown below.

	A	B	C	D
1	PRODUCT ID	PRODUCT NAME	PRICE	LIST
2	P1			Keyboard
3	P2			Scanner
4	P3			Joystick
5	P4			Mouse
6	P5			CPU

2. Highlight the entire column B by placing your cursor on the "B" label and clicking when you see the down pointing arrow.
3. Click the **Data Validation** drop down arrow located in the **Data tools** group under the **Data** tab. Then click **Data Validation** from the resulting dropdown menu option. This prompts the **Data Validation** dialogue box.
4. Click the **Allow:** drop down arrow and select **List** from the resulting options. This activates the **Source** text box. Type the cell reference of the cells containing the list items. In the above illustration, the list items are contained in column D (cell D2 to cell D6). So type **D2:D6** or click the

quick selection bolt located at the extreme end of the textbox. Clicking this bolt takes you back to your worksheet. Then highlight cells D2 to D6 and then click the minimized quick selection bolt again to return to dialogue box again. You will notice that Excel has automatically generated the absolute cell references (i.e. $D$2:$D$6) of the highlighted cells as shown below.



NOTE:

In a case where there is no column that contains the menu list item, you will type them directly under the **Source** text box separating each item with a comma and a space.

5. Check the check box which says: **Apply these changes to all other cells with the same settings**
6. Click Ok to exit the **Data Validation** dialogue box.

Excel add a drop down arrow beside each cell in column B as shown below.

	A	B	C	D
1	PRODUCT ID	PRODUCT NAME	ICE	LIST
2	P1	Keyboard		Keyboard
3	P2	Scanner		Scanner
4	P3	Joystick		Joystick
5	P4	Mouse		Mouse
6	P5	CPU		CPU

You will notice that each cell in column B, including cell B1 has a drop down arrow when activated. But you don't want a drop down list for cell B1 because it contains the column title.

To Remove the Drop Down Arrow from the Cell Containing the Column Title:

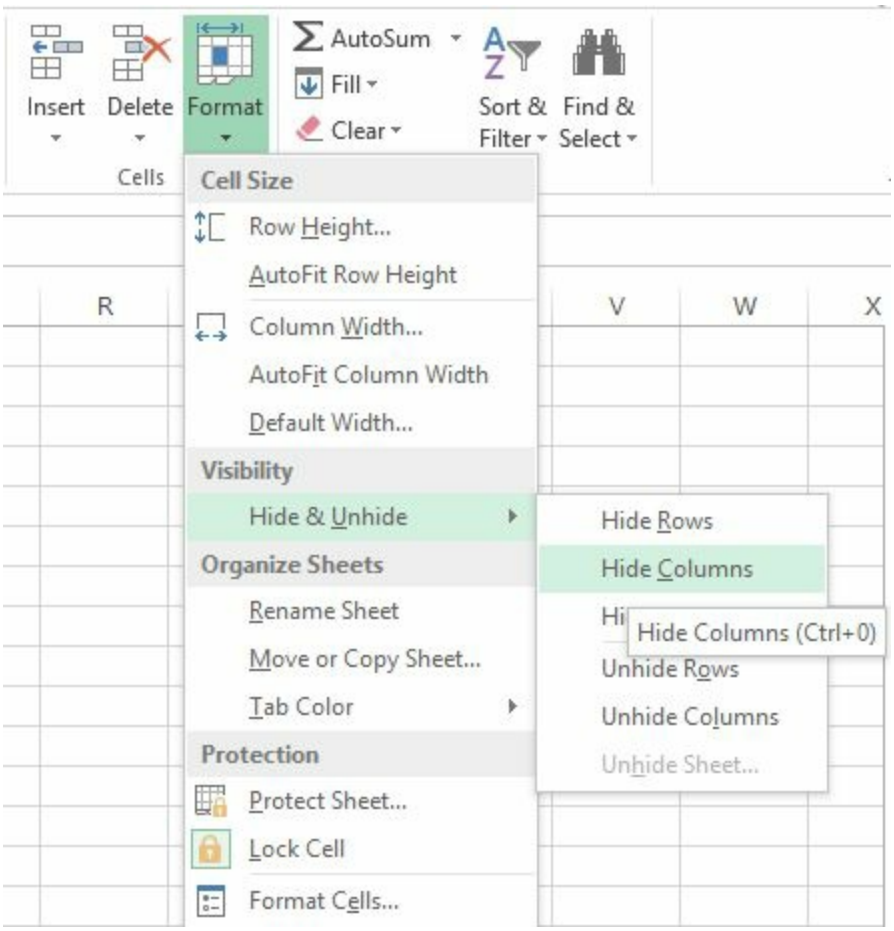
1. Highlight the cell containing the column title and call up the **Data Validation** dialogue box using the above listed procedure.
2. Select **Any Value** from the **Allow:** drop down menu but don't check any checkbox. Then click OK.

MS Excel removes the dropdown arrow with its menu from cell B1.

To make your workbook more dynamic, you may wish to hide the column which contains the list item (that is column D).

To Hide the Column:

1. First, highlight the entire column.
2. Click the **Home** tab and then click **Format** drop down arrow located in the **Cells** group. Click **Hide & Unhide**, a sub-option under the **Visibility** option as shown below.
3. Click **Hide Columns** and click OK.



NOTE:

The shortcut for hiding columns in MS Excel is **Ctrl + 0**. To un-hide a column, press **Ctrl + Shift +)**.

The shortcut for hiding rows in MS Excel is **Ctrl + 9**. To un-hide a row, press **Ctrl + Shift + (**.

HOW TO SET A CUSTOM ERROR MESSAGE FOR A WORKSHEET OR CELL IN MS EXCEL

Before an error message can be displayed, you must restrict what goes into a cell in your worksheet, so that when it is violated, the error message will be displayed. You should also set an input message for the cell or column to tell he user the type of data or number of characters to enter in that cell.

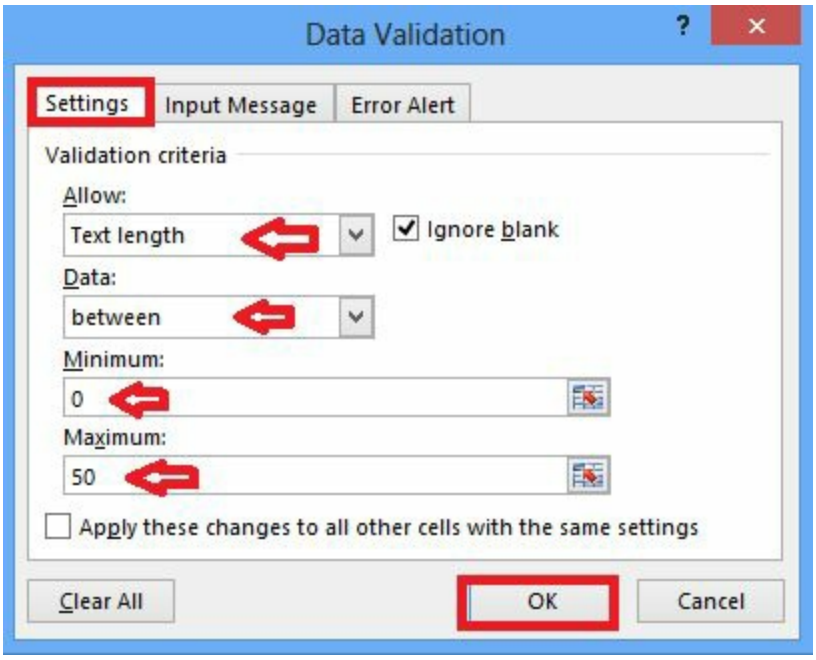
For example, as an MS Excel spreadsheet manager, you might want to design a product stock system for one of your clients. The system will have a PRODUCT DESCRIPTION column in which the number of characters for the description of each product must not be more than 50 characters. You will need to add a custom error message for that column through the **Data Validation** feature in Microsoft Excel. You can also set up input message to tell the user the type of data he or she is required to enter in that cell or column.

To Set a Custom Error Message for a Column in your Excel Worksheet:

1. Prepare your worksheet like the one shown below.

	A	B	C
1	PRODUCT ID	PRODUCT NAME	PRODUCT DESCRIPTION
2	P1	Keyboard	
3	P2	Scanner	
4	P3	Joystick	
5	P4	Mouse	
6	P5	CPU	

2. Highlight the entire column C by placing your cursor on the “C” label and clicking when you see the down pointing arrow.
3. Click the **Data Validation** drop down arrow located in the **Data tools** group under the **Data** tab. Then click **Data Validation** from the resulting dropdown menu option. This prompts the **Data Validation** dialogue box.
4. Under the **Settings** tab, click the **Allow:** drop down arrow and select **Text Length** from the resulting options. This activates the **Source** text box.
5. Select **between** from the **Data** drop down menu list.
6. Since the character should not be more than 50, type **0** in the **Minimum** text box and type **50** in the **Maximum** text box as shown below.

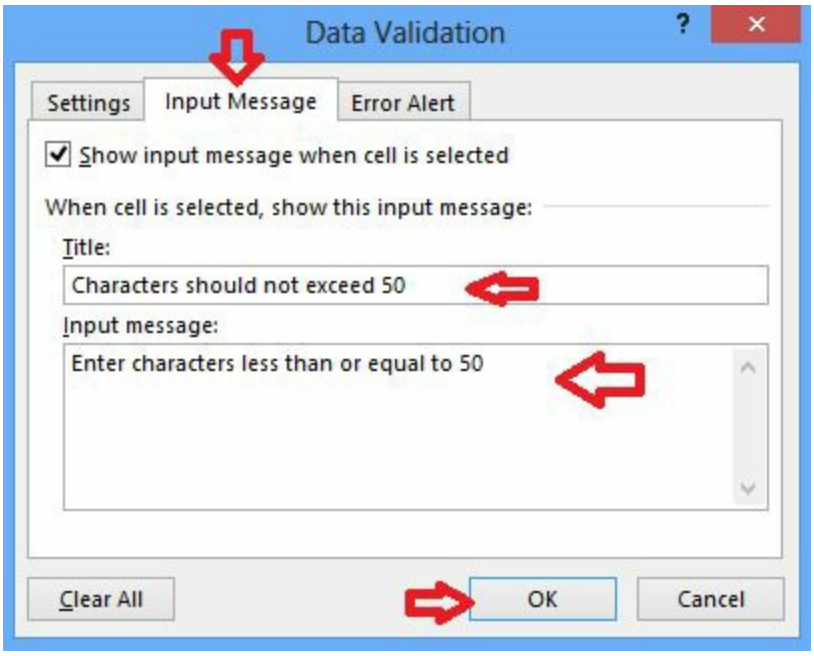


You have restricted the number of characters that each cell under the PRODUCT DESCRIPTION column will accept. But if the specified number of characters are exceeded, MS Excel will pop up a default error message dialogue box that warns the user about wrong entry without telling the user how to correct the mistake. So you need to set an input message that displays beside the selected cell and tells the user the type and number of characters accepted in that cell. But it is optional.

Then you need to customize the error message to advise the user on what to do.

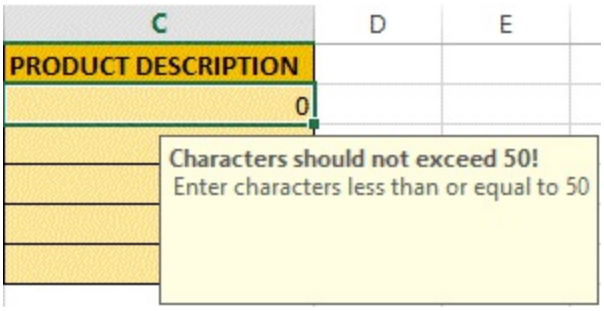
To Set a Custom Input Message for a Cell or Column in Excel:

1. Highlight the desired cell or entire column and call up the **Data Validation** dialogue box using the above specified procedure.
2. Click the **Input Message** tab and ensure that the **"Show input message when cell is selected"** check box is checked.
3. In the **Title** text box, type some text for the title of your input. For example, you can type: **Number of Characters Should Not Exceed 50!**
4. Click inside the **Error Message** field (also optional) and type some text for the main body of your input message as shown below. This explains more about what you wrote in the title text box.



5. Click OK to close the **Data Validation** dialogue box.

So once the user selects any cell under the DESCRIPTION column in the above worksheet, MS Excel displays your customized input message beside that cell as shown below.

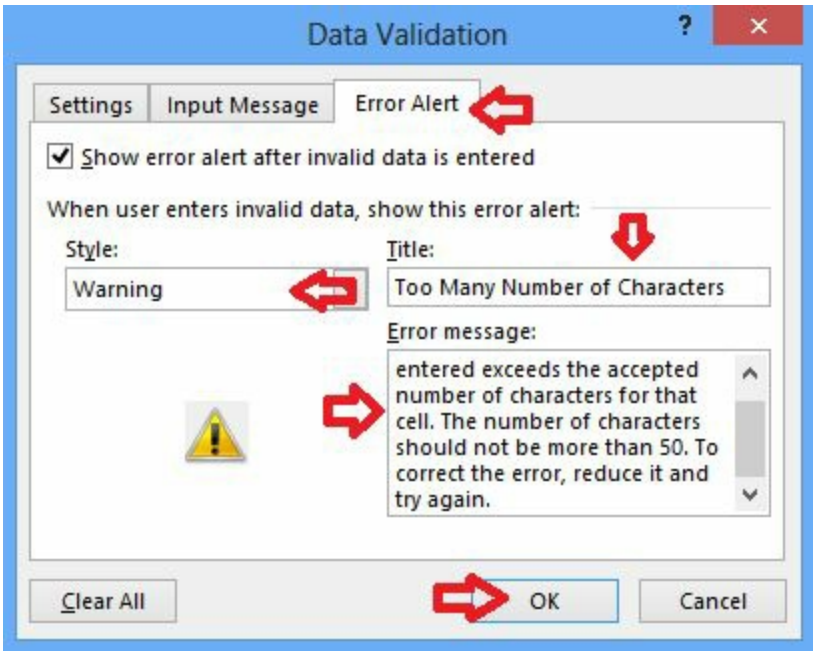


To Set a Custom Error Alert for a Cell or Column in Excel:

1. Highlight the desired cell or entire column and call up the **Data Validation** dialogue box using the above specified procedure.
2. Click the **Error Alert** tab and ensure that the **"Show error alert after invalid data is entered"** check box is checked.
3. You have three options to choose from the **Style** drop down menu: **Stop**, **warning** and **information**, you can select any of them. But I prefer using the **Warning** style.
4. In the **Title** text box, type some text for the title of your error message depending on the option you selected under the **Style** drop sown menu.

For example, you can type: **Too Many Number of Characters!**

5. Click inside the **Error Message** field and type some text for the main body of your error message as shown below. This explains what the user did wrong and the user can correct can correct the error.



6. Click OK to close the **Data Validation** dialogue box.

Now, you can test your custom error message by typing a description more than 50 characters in any of the cells of the PRODUCT DESCRIPTION column. Press Enter on your keyboard. Your customized error message should pop up as shown below.

PRACTICAL EXERCISE FOR ADVANCED EXCEL

Please try to practise these exercises on your own.

1. Design a Sales Report worksheet template for **Vegans Fast Food** from the scratch.

DESIGN TIP:

Just design it to your own taste but include the necessary columns like: Product name, Product ID, Cost price, Sales Price, Quantity balance, etc.

2. Design a workers' payroll system worksheet template for Joe-Links Services from the scratch.

DESIGN TIP:

Design to your own taste but include the necessary columns like: Workers name, Workers ID, Qualifications, Marital Status, Basic Salary, Marital Allowance, Tax, Net income, etc.

CONCLUSION

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Thanks!

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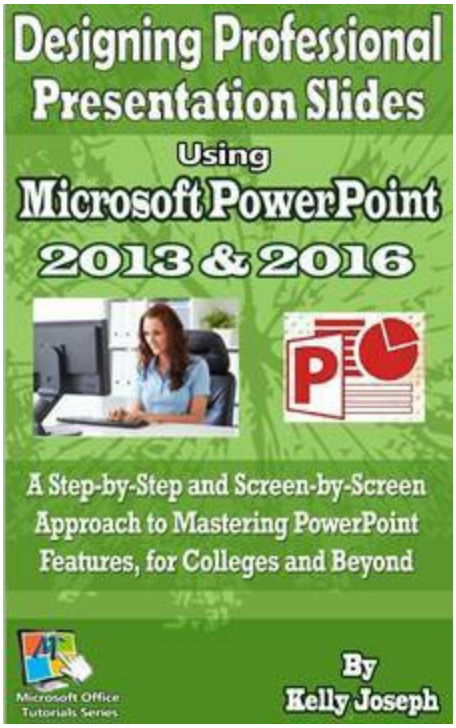

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